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MAY 1932

ELECTRICAL WORLD

N. E. L. A. CONVENTION NUMBER

Financial Survey Encouraging

— Operating companies show a decrease in net revenue of only 0.4 per cent
— Fifty utility common stocks now yield an average of 8.30 per cent
— Fifty utility bonds show an average current yield of 6.17 per cent

Rural Electrification Grows

— Potential use 8,000,000,000 Kw.-hr., present use 890,000,000 Kw.-hr.
— Average of 90,341 customers shows use of 1,603 Kw.-hr. per customer
— Construction costs have been reduced and new uses found

Domestic Market Stabilizes Earnings

— Domestic energy sales increase 28.2 per cent in 1931 over 1930
— Anti-merchandising legislation and agitation has halted generally
— Statistics show all markets are unsaturated and can be sold now

State Regulation Strengthened

— 40 of the 48 states now have state regulation of electric utilities
— Powers of commissions have been enlarged to include control of securities
— Negotiations for rate adjustments supplant litigation and valuations

New Equipment at Less Cost

— Remarkable developments in all classes of electrical apparatus
— Price level reduced at the same time that quality has improved
— Astonishing economies prove possible in adopting new construction

MAY 28, 1932

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ELECTRICAL WORLD

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for the Week Ending

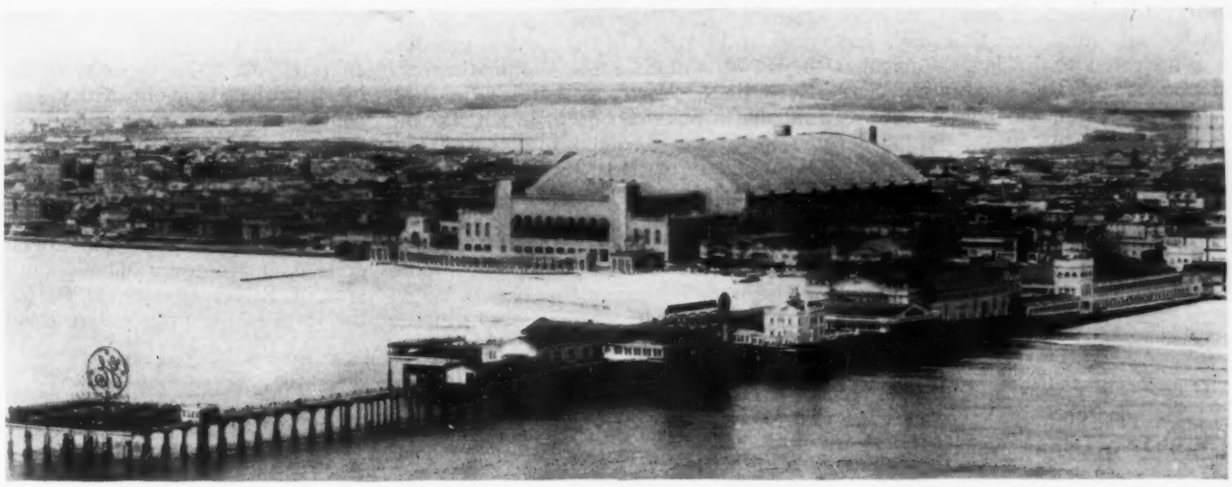
May 28, 1932

Ours is a selling job—J. F. Owens

—**Message of N.E.L.A. head** on the eve of that association's fifty-fifth convention is to regard the problems of the industry as those which only co-operation can solve and to apply that in the public interest—*p. 924.*

—**Commercial plans improve.** Recent experiments with group sales analyzed and policies and results compared. The all-electric home beckons the industry as brightly as ever—*pp. 949, 952, 959 and 966.*

—**Engineering in all fields** advances. Under insistence for economies in hard times manufacturers and system engineers do well. In generation, transmission and distribution new equipment and new practices are prominent —*pp. 934, 937 and 944.*



Ready for the N.E.L.A. convention

—**Regulatory situation better** as hasty and ill-advised laws are rejected by the states and commissioners assume a more active status. Tax situation changed but little—*p. 926.*

—**Financial situation analyzed** shows industry in relatively favored position. Operating companies show net earning decreases of but 0.4 per cent. New issues exceed financing needs slightly. Bonds yield 6.17 per cent; stocks 8.30—*p. 928.*

—**D.-c. motor drives use a.-c.** power. Recent development of glow-tube control for winding machine drive eliminates costly converting equipment and rheostats, giving better speed control with economy—*p. 919.*

—**National Electric Power** Company in co-operation with bankers and Middle West Utilities Company receivers works out a plan for the retirement of bank loans from current earnings. Reduction of 10 per cent made in first quarter—*p. 916.*

N.E.L.A. Convention Program About Ready

WHAT will probably prove to be the final form of the program for the annual convention of the National Electric Light Association, to be held at Atlantic City in the week beginning June 5, has been agreed upon at headquarters. It contains a few additions to and differences from the tentative program printed in the ELECTRICAL WORLD of May 14 (page 834).

Two addresses have been added—one for the second general session by H. P. Liversidge, vice-president Philadelphia Electric Company, on "Interstate Flow of Electrical Energy—Facts Versus Fancies," and one for the third general session by P. A. O'Connell, president National Retail Dry Goods Association, on "The Future of Retail Merchandising." Mr. Liversidge's address will take the place of the one at first scheduled to be made by D. F. Kelly, president "The Fair," Chicago. Charles F. Kettering, who, as previously stated, will address the first general session, will speak on "Some New Engineering Problems," and Vice-President P. M. Downing, at the second general session, will take as his title "Rate Simplification as an Industry Need."

E. Wilbur Rice, Jr., will preside at the Edison memorial ceremonies on Thursday. James S. Thomas' address, originally scheduled for that day, has been transferred to Friday. Chairman J. H. Lobban of the Accounting Section has taken for the subject of his address on the same day "Better and Cheaper Records." Kenneth Dameron's address has been transferred from this general session to that of the Commercial Section. Floyd L. Carlisle's subject at the public policy session on Thursday evening is to be "The Light and Power Industry and the Public Welfare." The engineering session address on operating problems will be made by Arthur E. Silver, Electric Bond & Share Company.

▼

Taxation Main Theme of Middle West N.E.L.A.

Recurring in one after another of the general session addresses, the theme of tax burdens and the necessity for their lightening dominated the convention of the Middle West Division, N.E.L.A., in Kansas City, May 18 to 20. Joseph F. Porter, president of the Kansas City Power & Light Company, said that governmental operation of utilities not only increased taxes but also imposed unequal distribution of them. George T. Buckingham, vice-president Illinois Power & Light Corporation, urged that the utilities actively identify themselves with local taxpayers' organizations, for these organizations speak with votes, which is the only language the politician can understand. F. R. McKelvey, former Governor of Nebraska, speaking as a farmer, opposed "taxing the value out of property."

A twenty-billion-dollar sales job was seen by J. F. Owens, N.E.L.A. president, to be ahead of the electric utilities. This job must be the dominating activity of the electrical industry, he said, but the utilities can do little without the co-operation of other branches. The best interest of those served will not be promoted by excessive safety requirements in wiring nor by high rates for electricity. Mr. Owens said that there would be no curtailment of geographic division activities of the N.E.L.A., no matter what changes may occur in the national organization, which, he said, is, in the last analysis, no more than a clearing house for local activities.

Merchandising by utilities was discussed from dealer and utility viewpoints by C. H. Chase, secretary Iowa Implement Dealers' Association, and C. A. Nash, vice-president United Light & Power Engineering & Construction Company.

Officers were elected as follows: President, James E. Harsh, vice-president Empire District Electric Company, Joplin; first vice-president, Roy Page, Omaha; second vice-president, George A. Neal, Sioux City; third vice-president, D. A. Ackers, Topeka. Thorne Browne of Lincoln was re-elected managing director.

▼

Current River Company Gets Commission Permit

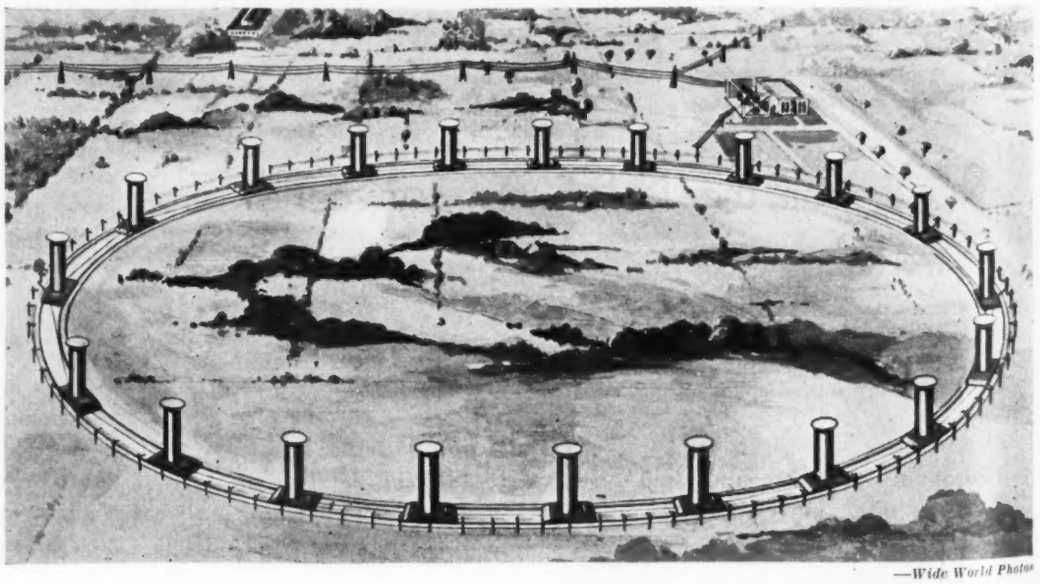
A preliminary permit was granted last week by the Federal Power Commission to the Current River Power Company of Kansas City for a power project above Doniphan on Current River in Ripley, Carter, and Shannon Counties, Mo. The commission rejected a conflicting application for a smaller project near the same site submitted by the Doniphan Hydro-Electric Company.

The Current River Power Company proposes the development of three power sites at Hargus Eddy, Mill Creek and Blair Creek. The capacity of the combined project is about 26,000 hp. Solid concrete dams of the gravity type from 84 ft. to 104 ft. in height are planned. The application of the Doniphan Hydro-Electric Company was rejected as less comprehensive and also because of the questionable safety of the hollow concrete dam proposed. Doniphan, county seat of Ripley County, is 60 ft. below the level of the proposed reservoir.

▼ ▼ ▼

WILL TOWERS LIKE THESE DOT THE LAND?

From the drawing herewith reproduced an idea may be had of what the wind-rotor generating plant which may be built at West Burlington, N. J., by six light and power companies (*Electrical World*, October 3, 1931, page 574) will look like if plan becomes fact. One of the proposed twenty 90-ft. cylindrical towers is nearing completion for trial purposes.



—*Wide World Photos*

College Professors Talk to Wisconsin Commission

Dr. Jacob Viner thinks the "fixity" of utility rates an important element in failure of business to recover.

"Failure of business activity to recover within a year or two at the most will mean widespread bankruptcy, intense suffering on the part of the poor and the unemployed, and a serious threat to the solvency of our governments," declared Jacob Viner, professor of economics at the University of Chicago, in testifying last week before the Wisconsin Public Service Commission in the course of that body's state-wide inquiry into the relation between business depression and utility rates (ELECTRICAL WORLD, May 14, page 837). "Of barriers to recovery, I am convinced that the fixity of utility rates is an important one."

"Utility rates," Dr. Viner went on, "are the most inflexible of all classes of prices, and the disparity between the trend for the last few years of utility rates and of the prices of raw materials and of agricultural products has undoubtedly been greater than for any other important groups of prices. The failure of utility rates to fall with the general downward trend of prices has been an important factor in reducing the buying power of the country's shrunken national income and in wiping out the profit margin of the country's industry, commerce and agriculture, and this is forcing a reduced scale of living and of productive effort."

Professor Viner, however, admitted on cross-examination that the depression would not be cured if the public service commissions could be given power to order immediately a 10 per cent reduction of utility rates all over the United States.

Prof. Frank A. Fetter of Princeton, past-president of the American Economic Association, agreed with Dr. Viner that reducing government-regulated prices like utility rates would have a favorable effect in hastening recovery to normal conditions.

Prof Edwin C. Mills, professor of economy and statistics at Columbia University; Dr. Edwin R. A. Seligman, professor emeritus of political economy at Columbia; Dr. William A. Paton, professor of economics and accounting at the University of Michigan; Prof. C. K. Leith of the University of Wisconsin and Dr. James C. Bonbright, professor of finance at Columbia University and secretary of the New York State Power Authority, were other scholastic authorities called on to testify at the inquiry.

Professor Bonbright declared that in view of the abnormal economic conditions it would be better for utility owners, from the standpoint of their securities investment, to submit to a reduction in rates rather than maintain the present charges "out of line with the business decline."

▼

Ripley Wants Federal Security Supervision

Dramatically announcing that "the broadcasting companies have refused to broadcast my speech," Professor William Z. Ripley of Harvard University, well-known commentator on contemporary business practices, told the annual conference of the National Association of Mutual Savings Banks last week that unsafe and unethical financial practices were being followed by certain public utility companies.

Emphasizing that his criticism was not intended to be universal and declaring that "no ground for apprehension of general demoralization among the public utilities exists," Professor Ripley maintained that "the chief part of this industry is honest, well-meaning and intelligent and has more at stake in the prevention of unsound practices than almost anybody else." He went on to say:

> Its credit—that is to say, its good repute—is in question. These men, the better part, may be expected to co-operate with the savings banks and the life insurance companies in such action as shall, through disclosure of all evidences of worth or unfitness, aid in the preservation of its high estate. It is with this constructive end in view that I venture upon these strictures.

Professor Ripley concentrated his attack upon certain bond issues which, he said, lacked the necessary requirements for the protection of investors. He mentioned particularly a recent issue of $40,000,000 sold to almost 250,000 security owners at a promised return upon "bonds" of 8½ per cent with all sorts of participations, part-time payments and tax exemption superadded, declaring:

> Prospective purchasers of public utility or other stocks and bonds should understand that a goodly measure of financing of doubtful character is the direct outcome of high-pressure salesmanship and of mass distribution of securities. Other things equal, beware of the offerings of those great sales organizations which bear a great overhead expense due to showy offices, prodigal advertising and an army of salaried drummers.
>
> Overdevelopment of the holding company has been the focus of attack from many quarters. Of late the pace has been accentuated. Had the paper company been used with restraint, as an aid to expert management for raising money through popular appeal, to afford insurance through spreading risk, all might have been well.

It is said that the "blue-penciling" which Professor Ripley had been requested to do by broadcasting-company representatives did not concern the thesis of his address or any specific portion of it, but only references to certain companies mentioned by him.

Government Financing Probable Soon

AFTER much inspired buying of government securities, during which the yield on Treasury 91-day bills has reached an unprecedentedly low basis and vast reserves of credit have been established, a billion-dollar federal bond issue is scheduled. Other offerings are likely later on.

Bankers and industrialists organize to find a way or ways in which the huge Federal Reserve credit resources may be put to work.

Meanwhile, the old story. Car loadings off 3 per cent from the previous week. Energy production falls. Security markets weak. Bank failures were 68 in April. Checks drawn last week were 43 per cent below a year ago and bank clearings were 48 per cent lower. Business failures continue to increase. Commodity prices work lower.

Good news? Well, Congress may adjourn before accomplishing too much of the damage proposed by it. Also, it might even show good faith on some of the hitherto empty discussions of possible economies.

▼

Another Indiana Case to Go to Supreme Court

Not only the Martinsville (Ind.) rate case, as noted last week (page 880), but also the Marion rate case from the same state, is to go to the United States Supreme Court for decision. In the Marion case (ELECTRICAL WORLD, February 6, page 295) the Indiana Public Service Commission ordered an emergency rate reduction of 20 per cent, and the Indiana General Service Corporation sought an interlocutory decree suspending the order on the ground of confiscation. The utility also maintained that its rates and earnings should be based on the valuation of its property in 21 cities, with headquarters in Muncie.

The latter contention was overruled by a three-judge federal court in Indianapolis, just as a similar plea had been in the Martinsville case; but the court held that the 20 per cent reduction was confiscatory and on this ground issued the decree, ordering the company to execute a bond for $100,000 to provide funds for the return of any amounts paid by customers exceeding such rates as may ultimately be found just. The commission took an appeal to the United States Supreme Court, notwithstanding that the court sustained it in its contention that the city is the unit for fixing rates and upheld its power to establish emergency rates not of an excessive kind.

Insull's "Big Three" to Finance Maturities

Approval of the application to the Illinois Commerce Commission this week by the Commonwealth Edison, People's Gas Light & Coke and Public Service of Northern Illinois companies for permission to issue an aggregate of $70,000,000 in bonds, the first tangible step toward the refunding of early maturities, was promptly given.

The Commonwealth Edison will sell $18,000,000 of first-mortgage, series C, 30-year, 5½ per cent bonds. It has a $20,000,000 maturity of 3½ per cent notes on June 30. People's Gas Light & Coke will refund a $15,000,000 July 30 maturity with $20,000,000 of 5½ per cent, 25-year first-mortgage bonds. Public Service of Northern Illinois will issue $32,000,000 first-lien and refunding mortgage, 20-year, 6½ per cent bonds to provide for $17,300,000 maturities during the next three months and to purchase property.

▼

Pacific Light & Power to Be Dissolved

The New York Stock Exchange has been notified by the Southern California Edison Company, Ltd., that the Pacific Light & Power Corporation, most of whose outstanding shares are owned by the company, is in process of liquidation. In the distribution of assets of the Pacific Light & Power Corporation there have been returned to the Southern California Edison Company 457,207 of its own common shares, including 456,872 shares not listed and 335 shares which were listed on the New York Stock Exchange. All of this stock so returned to the company has been canceled and Pacific Light & Power Corporation stock held by Southern California Edison has been returned to the Pacific Light & Power Corporation in connection with the dissolution of that company.

▼

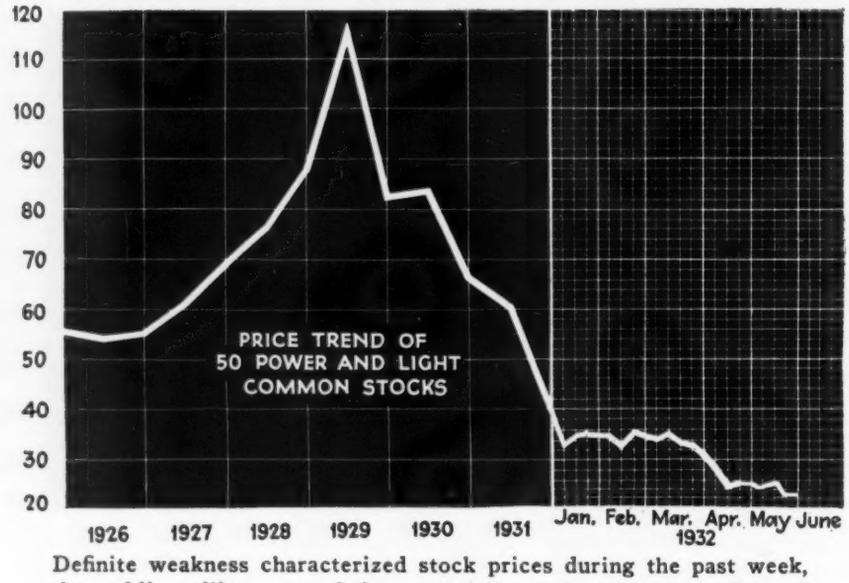
National Electric Power Plans Loan Retirements

New York banking interests, executives of the National Electric Power Company and receivers for the Middle West Utilities Company have, it is said, agreed upon a procedure which will permit the meeting of maturing obligation and the further retirement of National Electric Power's bank loans by means of payments out of earnings.

The National Electric Power on December 31, 1931, showed current assets of $22,751,000 and current liabilities of $40,759,000, including $33,551,000 of notes payable. Of these notes approximately $27,756,000 was payable to banks and $5,794,000 was due to others. About $21,000,000 is in secured loans. It is understood that $1,200,000 consists of a loan to the Middle West Utilities Company.

▼

Utility Stocks Decline



Definite weakness characterized stock prices during the past week, the public utility group being especially under pressure. Several issues lost from 3 to 4 points. The "Electrical World" index of 50 representative light and power stocks dropped to 22.3 from 23.5 the previous week.

Major New Construction This Week

TRANSFORMERS, motors, panelboards, instruments, conveyors, etc., will be installed in yard service and mechanical building for Cincinnati (Ohio) Union Terminal Company. Estimated cost $275,000.

Motors, controls, ornamental interior and exterior lighting equipment, conveyors, etc., will be installed in $200,000 factory and display headquarters of the American Tobacco Company at Trenton, N. J.

About $100,000 will be expended by Idabel, Okla., for proposed city-owned electric light and power plant.

Motors, controls, panelboards, instruments, electric-operated ventilating and air-conditioning equipment, costing over $85,000, will be installed in new school for Board of Education, Boston, Mass. A $900,000 project.

A $700,000 public market building authorized by City Council, New Orleans, La., will include power substation equipment motors, electrically operated ice-making and refrigerating machinery. To cost about $75,000.

Motors and industrial equipment needed for Forest Service building, Ogden, Utah, to be constructed by Treasury Department, Washington, D. C. Estimated cost $275,000.

According to a statement recently made by Harry Reid, president National Electric Power, "the company is paying for permanent improvements out of its cash income rather than through additional financing. The funded debt maturities occurring during the next twelve months amount to less than $3,000,000, of which more than a million dollars is owed within the system. Operating expenses have been strictly curtailed and dividends on the company's common stocks have been omitted. Since the first of the year notes payable to banks and others have been reduced by more than $3,000,000."

▼

Associated Gas & Electric Forecasts Early Changes

"It is possible," according to a statement issued this week by the Associated Gas & Electric Company, "that changes may shortly occur in the personnel of the company's board so that its supervision will be more largely or entirely in the hands of those actively connected with the management of the company and its subsidiaries."

The company has eleven directors. Four of them are officers of the Chase Harris Forbes Corporation. None of these four directors has yet resigned.

The statement announcing that the top holding company was unlikely to attempt any further financing for a con-

siderable period of time and that there would appear to be considerably less need for substantial banking representation on the board was, however, interpreted in Wall Street as indicating an early withdrawal of two or more officers of the Chase Harris Forbes Corporation now directors of the company.

The entire voting control of the company is vested with the class B stock, which is understood to be closely held by the management.

▼

Committee of Twelve to Employ Reserve Credit

Twelve well-known bankers and industrialists compose a committee which, it was announced late last week by Governor Harrison of the Federal Reserve Bank in New York, has been formed to co-operate with the Reconstruction Finance Corporation and other agencies to secure more co-ordinated and so more effective action on the part of banking and industrial interests for the purpose of making the large funds now being released by the Federal Reserve banks useful affirmatively in developing business.

Owen D. Young, chairman of the General Electric Company; Floyd L. Carlisle, chairman Consolidated Gas Company, and Walter S. Gifford, president American Telephone & Telegraph Company, are the utility men represented on what has been characterized as "the most powerful coalition of financial leadership since the days of the Liberty Loan committee."

In the last few weeks the Federal Reserve System has purchased more than $750,000,000 of United States government securities, putting into the market funds capable of supporting $7,250,000,000 of bank credit. By the formation of the new committee it is hoped to make the Federal Reserve's policy effective, bringing together the vast surplus of idle funds in the banks and the supposedly many projects needing credit and therefore held in abeyance throughout the country.

▼

Copper Duty Wins in Senate Tariff Fight

A two-day deadlock on tariff schedules in the tax bill was broken on Monday of this week when the Senate voted for import duties on lumber and copper. The vote to include the copper duty of 4 cents a pound, of which Senator Vanderberg of Michigan was the chief proponent, was 45 to 22. Balloting came at the end of a filibuster staged by opponents of the tariff items in an effort to force Senate leaders to exclude the import duties from the tax bill.

New York Commission and Associated G. & E. Contend

An investigation begun a year ago by the New York Public Service Commission of fees and charges paid by twelve operating companies of the Associated Gas & Electric system to the "service" companies affiliated with the system came to an end last week when counsel for the Associated system refused to produce as witnesses the responsible officials of the service companies.

The hearings, which were held in various cities in the state, disclosed the amounts paid by operating companies in the system to its service units. The commission sought information on the cost of supplying these services so that it might determine whether the charges made to the operating companies, and ultimately to be reckoned in their rate bases, were reasonable.

The inqury began when the charges assessed against the Rochester Gas & Electric Company and the Empire State Gas & Electric Company by service units of the Associated system were investigated. This investigation led to the wider inquiry into the service-company charges against all twelve operating subsidiaries of Associated Gas & Electric.

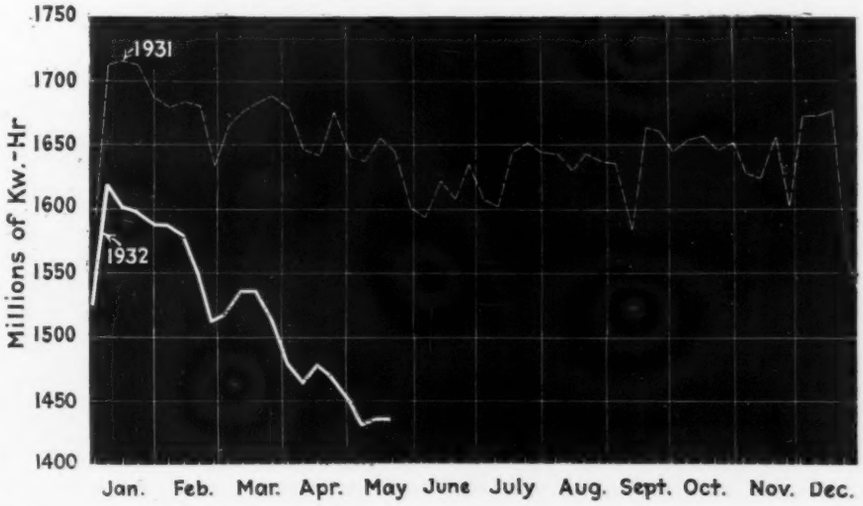
Commissioners Burritt and Brewster will submit a report to the full commission, based on the evidence available. After that the commission will decide what action, if any, is to be taken because of the refusal of counsel for the companies to produce the requested witnesses. The companies contend that the service companies and their contractual relations with other links in the Associated Gas & Electric system are beyond the jurisdiction of the Public Service Commission.

New York Metal Prices

	May 18, 1932 Cents per Pound	May 25, 1932 Cents per Pound
Copper, electrolytic..	5.33	5.33
Lead, Am. S. & R. price	3.00	3.00
Antimony	5.12½	5.12½
Nickel, ingot	35.00	35.00
Zinc, spots	2.675	3.225
Tin, Straits	20.85	21.00
Aluminum, 99 per cent.	23.30	23.30

▼

Spring Decline Pauses



FOR THE second consecutive week output statistics of electric light and power plants show resistance to the downward trend of the past several months. For the week ended May 21 energy production was virtually the same as in the preceding week and moderately exceeded that of the week of May 7. Compared with the corresponding four-year average there was no change; compared with 1931 there is still a large deficiency, but it decreased from 13.1 to 12.7 per cent.

Regional comparisons reveal an improvement, relative to 1931, on the Pacific Coast and, in limited degree, also on the Atlantic Seaboard. In the Central industrial area serious industrial inactivity persists, with production 16 per cent under last year's, as it has been for a number of weeks. In New England the low figure reported last week was repeated.

Weekly Output, Millions of Kw.-Hr.

May 21	1,436	1,645	1,723	1,705
May 14	1,437	1,654	1,717	1,704
May 7	1,429	1,637	1,689	1,698
April 30	1,455	1,644	1,698	1,688
April 23	1,470	1,676	1,725	1,700

Per Cent Change from 1931

Region	Week Ended May 21	May 14	May 7
Atlantic Seaboard	— 9.9	—10.6	— 8.9
New England alone	—14.0	—14.3	—11.8
Central industrial	—16.4	—16.2	—16.3
Chicago district	—13.6	—11.6	—14.4
Pacific Coast	— 9.2	—11.7	—12.0
United States	—12.7	—13.1	—12.7

Bayley Hipkins Bids Low on Diablo

Bidding $1,744,705, a sum $399,473 less than the second bid and nearly a million less than the only other one, Bayley Hipkins, Inc., Seattle, has again submitted the best offer financially for the completion of the Diablo hydro-electric project. All the bids were sent to the City Council for action. The successful bidder will be required to accept light and power bonds, 1927 issue, to cover the cost of the work and $1,854,000 worth of 1930 light and power bonds to pay existing indebtedness (ELECTRICAL WORLD, April 30, page 757).

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Potomac Electric, New Plant Site

The National Capital Park and Planning Commission has approved the plan of the Potomac Electric Power Company providing for erection of a five-million-dollar generating plant at Buzzard's Point, on the Anacostia River, so as to give it the advantages of water transportation. Three plans were submitted, and the commission chose that contemplating construction on the eastern side of the point in the vicinity of Water, U and V Streets, S.W. and S.E.

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Piccadilly Circus Resplendent

Piccadilly Circus, London, which since 1910 had been illuminated by gas, is now rejoicing in a 60-kv. installation, affording a standard of 2 ft.-candles, said to make it the most brilliantly lighted street junction in Europe or the British Empire. Four bronze columns have been placed around the Eros statue in the center of the circus. Each carries a 1,500-watt lamp and is about 22 ft. high. There are also twelve cast-iron columns, 26 ft. high, each carrying three 1,500-watt gas-filled lamps.

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Delay in Quebec Development

The Quebec government has granted to the Shawinigan Water & Power Company a two years' delay, until July, 1935, in the time when 100,000 hp. must be available from its plant now under construction on the Upper St. Maurice at Rapide Blanc. The agreement also provides for a temporary reduction in both rental and royalty payments.

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Nebraska Commission's New View

After having for years held that it had no inherent power to issue certificates of convenience and necessity, the Nebraska State Railway Commission has notified all taxicab companies in Omaha that they will not be permitted to operate until they have secured such certificates. This decision, made to protect a street railway company from a 10-cent base rate, has been welcomed by public utility companies, since in making it the commission holds that the constitutional grant of power to regulate competition carries with it the power to prohibit it where the public interest is fully protected.

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Need 60,000 Kw. for Aqueduct

The Metropolitan Water District of Southern California is inviting bids in three divisions for furnishing electrical energy for the construction of the proposed Colorado River aqueduct. Item one calls for 4,000 kw. at Lakeview, 4,000 kw. at Cabazon, 5,000 kw. at Fan Hill, 4,000 kw. at Hayfield, 4,000 kw. at Iron Mountain, and possibly 4,500 at Parker, at approximately 33,000 volts. Item two calls for 4,000 kw. at Lakeview, 4,000 kw. at Cabazon and 5,000 kw. at Fan Hill at the same voltage. Item three calls for 23,000 kw. or 27,000 kw. at a substation within 50 miles of the Cajalco reservoir site.

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Lower Rates Sought in Arizona

Announcement is made by the State Corporation Commission of Arizona that, being without funds for rate valuations, it will, because of public agitation for reductions, hold conferences with utility companies and others in Phoenix and elsewhere in an effort to accomplish a lowering of rates at the earliest possible moment. The Central Arizona Light & Power Company has voluntarily discontinued the penalty hitherto imposed on tardy payment of monthly bills.

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Coming Meetings

National Electric Light Association—Atlantic City, N. J., June 6-10. A. J. Marshall, 420 Lexington Ave., New York.

Pacific Coast Electrical Association—Hotel Huntington, Pasadena, Calif. June 14-17. K. I. Dazey, 447 Sutter St., San Francisco.

Canadian Electrical Association—Manor Richelieu, Murray Bay, Que., June 15-17. B. C. Fairchild, 409 Power Bldg., Montreal.

Public Utilities Advertising Association—Waldorf-Astoria, New York, week June 19. J. R. Pershall, Public Service Co. of Northern Illinois, Chicago.

American Society of Agricultural Engineers—Columbus, Ohio, June 20-23. Raymond Olney, St. Joseph, Mich.

American Institute of Electrical Engineers—Summer convention, Cleveland, June 20-24; Pacific Coast convention, Vancouver, B. C., Aug. 29-Sept. 2. Acting secretary, 33 West 39th St., New York.

American Society for Testing Materials—Chalfonte-Haddon, Atlantic City, June 20-24. C. L. Warwick, 1315 Spruce St., Philadelphia.

American Society of Mechanical Engineers—Bigwin Inn, Lake of Bays, Ontario, June 27-July 1. C. W. Rice, 29 W. 39th St., New York.

New England Division, N.E.L.A.—Mount Washington Hotel, Bretton Woods, N. H., July 11-13. Miss O. A. Bursiel, 20 Providence St., Boston.

Camp Co-operation XII—By boat to Bermuda, Aug. 3-8. Society for Electrical Development, 420 Lexington Ave., New York.

Work on Seal Beach Unit Suspended

Completion of an additional 37,500-kw. generating unit at the Seal Beach steam station of the Los Angeles Gas & Electric Corporation, construction of which was begun in February this year, will be deferred until re-establishment of satisfactory load conditions warrants additional generating capacity, according to H. L. Masser, vice-president and executive engineer of the corporation. Present work on the unit will end with completion of the foundation structure.

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Lockport Fights for Niagara Water

Charles A. Russell, former counsel for the Federal Power Commission, appeared before the District of Columbia Supreme Court last week and urged that body to require the commission to hear the application of the city of Lockport, N. Y., for the 275 sec.-ft. of Niagara water for which the Niagara Falls Power Company has temporary rights which it seeks to make permanent. Mr. Russell charged the commission with misleading Lockport's authorities and unfairly rejecting their petition (ELECTRICAL WORLD, March 12, page 471).

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Tulare Would Buy Private Lines

August 5 has been set by the California Railroad Commission for hearing the application of the city of Tulare to fix the compensation to be paid for the electric distribution system of the Southern California Edison Company within the limits of that municipality. The city offered to buy the system for $120,000, but the power company announced that it values its property at $350,000.

▼

Why Ontario Hydro Paid Aird

Recent high lights of the investigation into Ontario Hydro-Electric Power Commission matters have been a statement made by C. A. Magrath, former chairman of the commission, that he kept John Aird, Jr., "pretty close" because he did not want him to negotiate with United States interests for the sale of the Madawaska River power developments, and the admission by Premier Henry of Ontario that, without ascertaining details, the Ontario Cabinet "O.K.'d" a commission bill for $66,000 for preliminary investigation and survey of the Madawaska River power sites. Included in this $66,000 was $50,000 which some months previously had gone to John Aird, Jr. "Not one dollar was ever paid except for business reasons," Mr. Magrath said. He accepted full responsibility for the payment to Aird, because the latter had given the Hydro free rein in dealing directly with the owner,

M. J. O'Brien of Ottawa, and had relinquished an option on the property. Moreover, said Mr. Magrath: "I didn't want him to get loose in the United States, because he could get into any financial house in that country." Aird is the son of Sir John Aird, president of the Canadian Bank of Commerce.

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Central Illinois Company Before Trade Commission

Only two witnesses were examined before the Federal Trade Commission when, on May 18, it delved into the affairs of the Central Illinois Public Service Company, a subsidiary of the Middle West Utilities Company with headquarters at Springfield, Ill. Slightly more than 10 per cent of its output is exported to other states, according to Examiner H. H. Carter, and a considerable amount of energy is imported, more than half from Indiana.

The growth of this utility, R. J. Ryder, another examiner, testified, "really commenced in 1912 when the predecessor Central Illinois Public Service Company came under the control of the Insull interests." Mr. Ryder said that the fixed capital of the company grew from $9,222,974 at the close of 1912 to $86,654,581 at the close of 1930. The total increase of $77,431,607, he stated, has been due to acquisition and construction work in the various activities in which the company is engaged.

Hearings in the utility investigation were adjourned with no date set for resumption.

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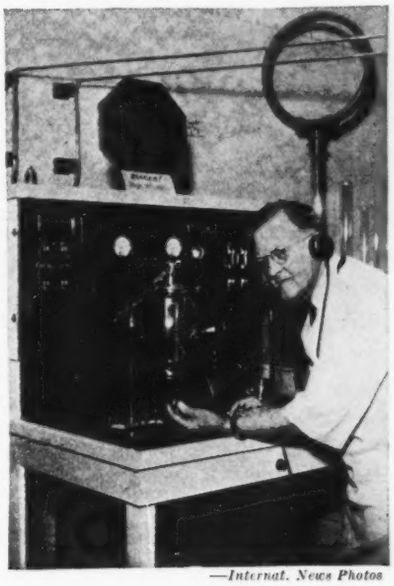
International Electrical Congress Membership Rules

Further information concerning the International Congress of Electricity, which will be held in Paris on July 4 to 12, has just been issued by the American organization committee, of which Dr. A. E. Kennelly of Harvard is chairman and Dr. Harold Pender of the University of Pennsylvania is secretary. The congress is open to all persons who wish to participate either in a personal capacity or as representatives of an administration, a group, a syndicate, an association or a company. There will be three classes of members—benefactor members, who will make a contribution of at least 1,000 French francs; subscribing members, who will pay 250 francs, and related members, whose membership fee will be 50 francs. The latter classification is intended to apply to the families of members of the congress. All wishing to join must advise the head office of the congress, 134 Boulevard Haussmann, Paris, before June 15, inclosing remittance.

Benefactor members will be entitled to receive free of charge the entire collection of "transactions" and, if desired, may take advantage of a discount of 25 per cent on the normal selling price for the purchase of supplementary volumes. Subscribing members will be entitled to receive free of charge the volume or volumes containing the transactions of any one section and can purchase, with a reduction of 25 per cent on the normal selling price, all or part of other volumes containing the "transactions." The text will be in French.

The outline of the divisions of the congress remains as printed (with titles and contributors of American papers) in the ELECTRICAL WORLD for January 9, page 78, except for a misprint under Section VI, which should have read: "Electric Lighting; Photometry." A thirteenth section has been added: "Teaching and History of Electricity."

A WAY TO COUNT IONS



—*Internat. News Photos*

This instrument, used in a Pacific Coast laboratory, enables the scientist to isolate and count different kinds of ions and measure the wave lengths of their emissions. In its operation 3,000 volts d.c. is increased in effectiveness many hundreds of times by high-frequency transformers.

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Supervisory Control for 89 Subway Substations

Supervision of the operations of 89 substations, involving in the aggregate 24 synchronous converters, 99 mercury-arc rectifiers, 202 ventilating fans and 817 automatic direct-current reclosing feeders and track breakers, will be automatically made by General Electric synchronous selector-type equipment when New York City's Eighth Avenue subway goes into operation. In addition, this supervisory system, probably the largest ever attempted, will provide extensive telemetering facilities.

It will be possible for the load dispatcher at the central substation to start or stop the machines in the various other substations, to release for automatic operation or lock out the direct-current feeders, to start or stop the ventilating fans and to open or close the series track breakers. The load dispatcher may also release a multiple-unit substation for independent automatic operation or he may place it directly under control. Lamps will indicate the condition of operation to him in all cases.

An alarm system is installed in the subway, and by means of boxes of fire-alarm type installed at frequent intervals along the tracks a supervisory master trip circuit will immediately kill the third rail in the vicinity, start the ventilating fans and report the occurrence to the load dispatcher's office.

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Simple Control Permits D.-C. Drive from A.-C. Power

Through electron-tube control a difficult machine-drive problem has been solved with notable simplification. For many factory machines variable-voltage, direct-current motors, which may be flexible as to speeds over a wide range, are particularly suited. The conversion of the commonly available alternating-current supply has often involved equipment costing more than the motors, however.

No machines have more difficult speed requirements than coil winders with their incessant stopping, starting and slow running, and hitherto these machines have had to be handled by the barbarous expedient of a slipping clutch.

In the East Pittsburgh works of the Westinghouse Electric & Manufacturing Company a coil winder, with a 1-hp. direct-current shunt motor, now operates from the 25-cycle alternating-current supply, under perfect speed control from stand-still to full speed, without any rheostatic losses whatever, by dint of four small thermionic tubes and their adjuncts. Control is by foot pedal, which pushes an iron core into and out of a solenoid and thus changes the power factor of the grids in two tubes.

The tubes, two 1-amp. rectifiers supplying the field coils and two 6-amp. grid glows for the armature serve to rectify the alternating-current waves, and the tubes, under the action of the grid, also chip off greater or less amounts of the wave, giving a variable effective direct-current voltage from a constant alternating-current voltage.

EDITORIALS

L.W.W.MORROW
Editor

The tocsin has sounded

NOT as an alarm but as a summons to training camp, the tocsin has sounded, and the utility clans will gather on June 5 in Atlantic City for the N.E.L.A. convention. This is a critical year for the industry, and for this very reason the coming meeting should contain large potentialities for good. Personal contacts, addresses of industry leaders and views of new equipment will supply the means for changing individuals with diverse thoughts and programs into concordant representatives of an industry with a definite program and policy. This composite group should emerge as the shock troops that will be relied upon to wage victorious battle in the coming year.

There is ample reason for courage and optimism. Earnings are good, properties are in splendid condition, and the markets for more business and new business are unfilled. Large rewards are in store for the industry if it will seize its opportunities, agree upon a program and go forward with courage. Troubles are psychological manifestations and are at least relative if not imaginary. To eliminate them from the mind vocal expression to a sympathetic listener with a cordial handclasp and a warm smile goes a long way. Most of the troubles of utility men have come about because of their personal losses. They bet on their company securities because they had faith in them and because they knew the future possibilities. It is high time to forget the "boom era" stock market and to remember that all tangible values still remain in the industry and all possibilities for expansion still exist. The industry is vigorous and vital, and this convention should change the psychological atmosphere from that of a wake to that of a celebration marking renewed faith in the industry. It should bring about a strong determination to earn new levels of personal as well as industry prosperity. The time of stress gives impetus to the development of strong leadership and an aggressive personnel in order to make new accomplishments possible. Men in the highest as well as lowest positions need the counsel, the information and the stimulation that will come from this convention.

Informed opinion shows the necessity for some changes and readjustments in the industry. Operation, finance, management, equipment—each aspect of the business has been tried in the fire of depression. Strong points have been accented, weak points have become dangerous, technological progress has been made and the industry's economic, social and political environment has been changed. Readjustments are necessary in order to have the industry function more economically under the new conditions. Such changes are constructive and not destructive in effect if handled wisely. They should be capitalized. Never has the industry studied its policies and operations so thoroughly, and never has it been so influenced by outside forces. These things should make possible a new and better era in utility operations.

The credit position of the utilities and the possibilities for financing their expansion programs; the wave of increased taxation and its effects; the changes in state regulation and the proposals for federal regulation; the domestic market with its unsold possibilities tied into rates, trade relations

and merchandising plans; the opportunities for power sales and changes in the competitive position of private plants; new conceptions of public relations; the remarkable economies found possible in system operation; the holding company as an agency under new conditions—never were there more subjects of vital importance to the industry. These topics need convention presentations and discussion so that uniform industry policies may be formulated to guide action.

All these things reduce to an attempt to carry out the industry's objective of an electrified country more rapidly and more economically. This convention will mark a new starting point for a race to new goals. Industry men cannot afford to disobey the call of the tocsin in a year when so much is at stake.

Why not accept the challenge?

ACCORDING to many reputable thinkers the greatest hope for a revival in general business lies in the electrical industry. These sentiments are vague in detail and are chiefly generalizations based upon past accomplishments, a realization of the fertility of electricity and a recognition of the effects produced by the growth of the automotive, radio, light and power and communication branches of industry.

Why not accept the challenge? The electrical industry is necessary and is sound. It is in a better financial and earnings position than other industries. It has a very large assortment of business possibilities that have not been realized. It can double and treble its present business if it will.

Present markets for electrical products are unsaturated. In homes, in public streets and buildings and in factories an enormous market exists for electrical products. Again, such services as light and power, communication and electrical transportation are not half sold. Each market for service can be sold under competitive conditions to double the present business at least. But in addition to present products and present services there are many new things awaiting commercial exploitation.

Just now air conditioning is in the limelight, and there is no valid reason for not selling air conditioning to every home, factory and commercial building. Radio is just started and never has been developed as a service on an intelligent basis. People will buy home entertainment if it is available to them, and even now talking movies, radio entertainment, television and other programs for "evenings at home," such as books and operas for photocell and vacuum-tube reproduction from films, are a few of the new things that can make each home a self-contained educational and entertainment center. In lighting, electrometallurgy, industrial production and many other fields new developments and processes are ready to replace the old way with the electrical way.

Modern wealth is energy applied to keep goods and services in action, and the universal form of energy available at virtually no cost is electricity. Intelligently applied and sold, it can revive American business and readjust affairs to a scale of prosperity undreamed of in the past. All this may be done if electrical men have the will to do it. A definite start would be a nation-wide campaign to restore the confidence of investors in the industry so that money could be had to enable the industry to do the many things that can be done to bring new levels of prosperity.

Engineering bombs await fuses

WHEN times are prosperous new developments are slow in application and efforts are focused upon the commercial exploitation of the existing apparatus. When times are bad capital and business are under necessity to accept and use new and better things even though these mean the confiscation of investments and changes in operations. And the engineers are the modern anarchists endowed by capital in times of bad business to throw the bombs that wreck the *status quo*.

New equipments, new methods and new technical knowledge are being taken off the shelves and put to work. A remarkable array of new technical contributions awaits any one who tries to learn about such things at this time, and what might be called technological obsolescence has become a factor of greater magnitude than many executives realize. These new developments are here, and they will be used even though this is a zero hour in the marketplace.

Every field of equipment has been studied by manufacturers' engineers to good advantage. In power generation we have two-fluid cycles, unit power stations, outdoor power stations, single-control stations, higher ratings, larger units and possible economic assemblies that cut first cost and operating cost so greatly that many installations even five years old are technologically and economically obsolete.

In power transmission and distribution we have new insulators, new relays, lightning-proof lines, surge-proof transformers, unit factory-built substations, new arresters, new load-control and frequency instruments, new cables and new ideas for construction and installation that will permit of major economies in future programs for expansion. The networks for underground and overhead installation are growing in favor. Even the old cut-outs and fuses are marked for obsolescence in the near future, and the research horizon on direct-current transmission, new meters, non-oil-filled transformers and electron-tube devices is filled with looming shadows.

Industrial developments are of equal portent. Joint power stations, factory-built substations, synthetic molded products, direct winnowing of metals from ores, electrolytic production of alloys, gaseous lighting, electronic controls, electric heating—many equipments and processes point the way to renewed activity in industrial electrification.

Undoubtedly the contributions of the engineers mean replacement in old industries and the establishment of new branches of industry. These things spell opportunity for engineers once general business is off dead center.

Political horizons clearing

THE position of utilities in the political forum has been improved greatly during the past year. This has come about because of the relatively greater importance of other subjects and because the industry has learned how to deal better with political aspects of the business. Loud and long shouts for and against utilities have been displaced by a fuller measure of understanding and co-operation and by greater silence.

Utility policy is to deal with politics locally, if at all, and to render attacks of politicians futile by giving good service, by telling customers all the facts about the business and by conducting the business for the advancement of the communities served. On the other hand, the politicians find ample public interest in taxation, budgets, unemployment and governmental economy. Too many critical issues are disturbing the public mind for politicians to get attention through attacks on an industry that is sound and constructive.

Thus political action affecting utilities is taking definite form only as it bears upon the national business situation. One aspect is the increase in taxation. There has been little sentiment for an increase in kilowatt-hour taxation, but taxes on property and plant and upon gross revenues have increased. In several instances taxes are from 10 to 15 per cent of gross revenues, and this burden has an appreciable influence upon rate reductions and business expansion. The utilities, however, while believing direct taxation of energy to be short-sighted, are glad to share equitably the national burden of taxation and contribute taxes cheerfully so long as they are distributed fairly.

Regulation is another definite political manifestation, and in recent months there has been considerable strengthening of the regulatory powers of state commissions. This trend has been little accented in the public press, but it has shown that it is possible and feasible for state commissions to control all essentials of the business that affect the public interest. Federal regulation has never been needed, and the new developments in state regulation will make this fact obvious to the public.

Nor has anti-merchandising legislation made headway during the year. Co-operation with dealers, round-table discussions with trade groups, clarification of utility merchandising policies, improved merchandising practices—all these things have brought about better understanding and made legislation upon merchandising unnecessary. The political aspect of the question has served as a great stimulus to co-operation in domestic market development and has been an asset to the industry.

Thus a survey of the political horizon shows few clouds. In legislative matters the industry is in a better position than for several years. It has improved its policies and practices very greatly, and these will reflect themselves in a better political atmosphere when the present national emergency shall have been met.

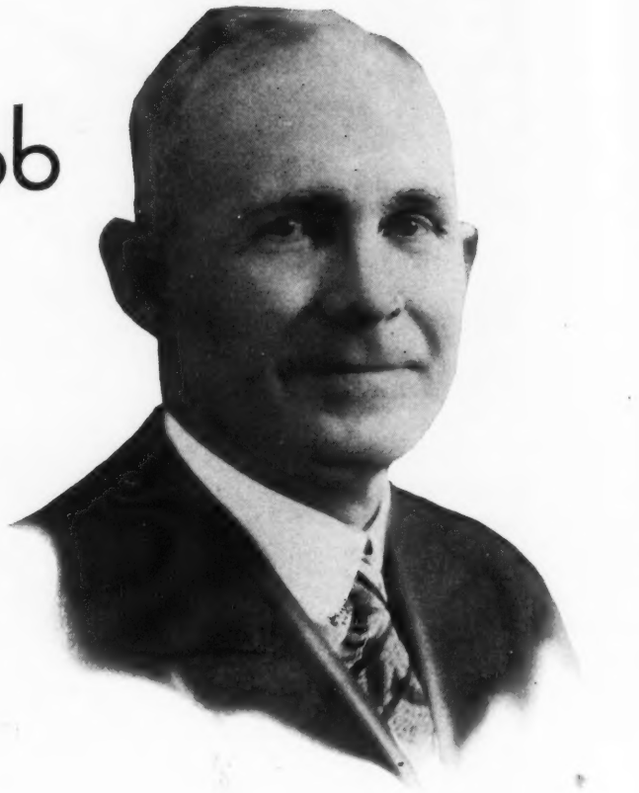
FOR NEW INSPIRATION

Visit Atlantic City, June 5-10

Ours a Selling Job

By J. F. OWENS

President National Electric Light Association



SEPTEMBER, 1882, on Pearl Street, New York City, an industry was born. It was a puny infant, and the fact that it was not wanted, except by the authors of its being, hampered its early development.

A half century has passed and the year marking the 50th anniversary of its birth finds it full of vigor and stamina, with a record of accomplishment in its short span of life unequaled in the history of the world.

Today its contacts touch the lives of 100,000,000 men, women and children in the land of its birth and countless millions in other parts of the world.

It has a glorious past. What of its future? Shall its future be in the custody of and shaped by its friends, or shall the shafts of its enemies turn it from its course? Shall its friends be interested enough and wary enough to look for dangers ahead and to warn it how to shape its course?

One thing is certain, from its infancy its chief job was one of selling. In this it but followed in the footsteps of every successful individual or business venture.

Every man is essentially a salesman. As soon as he comes to a realization that to develop his latent ability he must not only impress but work with other individuals, he becomes a salesman, with himself as his merchandise.

To the degree that he knows himself, that he takes the care to evaluate himself in terms of his usefulness to others and to the society of which he is a part, he is successful, assuming, of course, that the goods he has to offer will stand the test.

The primary function of every business is that of selling, whether it be material wares or human service. Particularly does this generalization apply to our business.

We have always been selling. First, it was the investor who must be sold on the possibilities of our business as a money-making venture and one to which he could intrust his savings. Next, it was the possible user of our service who must be taught of its advantages to him in the form of comfort, time saved and leisure gained.

Then followed the selling to the body public a realization that we, as a commercial organization, could do the job of providing its electric needs better than could it as a body politic. Nor is this a finished task. Our industry is never oversold, nor will the time ever come when we shall not be confronted with the necessity of iterating and reiterating facts and arguments to justify in the public mind our conduct.

Ours shall always be primarily a selling job, but what shall we sell? When we speak of selling, do we mean the purveying of material things? Do we mean simply appliances, or do we look deeper and realize that back of the appliance must be something even more valuable and necessary to us and to the users of our service; a something that, although it is intangible, is, none the less, all important?

Must we not be selling continuously the idea of commercial operation as opposed to political? Must we not be ever alert as an outstanding exemplar of what individual initiative and enterprise can do in the development of an industry, ever to bring to the attention of the users of our service that their interest is best served by co-operating with us in the retention of the American business idea?

And what of the means to accomplish this selling job? Certainly, unless we marshall the tremendous forces that we have within our industry and call them to our assistance, we shall not have discharged our selling obligation. I am speaking of our 300,000 employees. Nor is it enough to employ their services. There is a constant need of informing, developing and encouraging them. Nor is this enough!

Associated with the central-station branch of the industry are the army divisions of the manufacturers, the jobbers, the dealers and the retailers. Obviously, the selling job to which the users of electricity are entitled cannot be done unless and until all the divisions of the grand army employed in the manufacture, distribution and sale of electricity or of the mechanical means of operating and utilizing electricity are working harmoniously, inspired by a desire to bring about the objective in which each has a vital interest—that of bringing to the home, the business enterprise, the factory, not only

the opportunity of utilizing to the full this great servant of mankind, but the knowledge which will make its use a delight and its users enthusiastic supporters of the system which has developed it and made it available.

It is an obvious prerequisite to consumer understanding that there be interindustry understanding. The job the public has a right to expect cannot be done without the hearty co-operation of every branch of the industry. Certainly, with the inspiring task ahead of us, it is folly to dissipate our energies in internal strife and petty bickerings.

After all, our problem is simple—that of making it possible for the consumer of electricity to utilize more and more of our service. Each branch of the industry will be the beneficiary of the results following a policy of understanding and co-operation.

In this year 1932, with the heartening record of 50 years of accomplishment behind us, let us emulate the industry pioneers who so thoroughly exemplified the spirit that has made America. Let us unite all of the industry forces and, with "Co-operation" as our slogan, go forth to do the job in the public interest.

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Few New Regulatory Laws, But More Active Commissions

TAKING legislative accomplishments as a sole basis, a résumé of the regulatory field would show remarkably little change from the situation as the 1931 assemblies left it. But this paints a wholly inadequate picture. Things have happened aplenty in the domain of the commissions in their functioning under existing statutes. Also hasty and ill-advised new laws were proposed to several of the legislatures. However, sober thought either let them die in committee or else, their fallacies and futility exposed in debate, they were killed by assembly vote or gubernatorial veto. Regulation, on the whole, has been prodded and inspired into activity. It seems to be moving slowly out of the realm of static reliance on legal rigidity into the realm of dynamic response to economic sentiment. The harping of the liberals and demagogues has forced a dimly perceived social picture into better focus. There are a few "sons of wild jackasses" romping in the foreground, but the background is not in any sense convulsive. On the contrary, the figures there look hopefully sane and intelligent.

Kentucky will remain among the eight states which provide no regulation over electric utilities. Mississippi has not yet acted upon the Governor's proposal to enlarge the powers of its Railroad Commission. The status is therefore practically unchanged from that of a year ago when 40 out of 48 states, as well as the District of Columbia, had electric utilities under regulation.

South Carolina joins regulatory group

Few bills of consequence were passed that definitely enlarged the powers of commissions over electric utilities. South Carolina provided most of the excitement in the legislative arena. A special legislative committee instituted in 1931 to investigate power rates reported valuations of the order of half what the companies claimed. The railroad commission thereupon ordered the utilities, without hearing, to file within twenty days rates based on these committee findings. At first the companies balked, not only on the rate order but on the regulatory bill advocated by the legislative committee. Some measure of compromise resulted in the passage of a bill which (1) puts municipalities under the commission if they serve otherwise unserved area adjacent to their territory, (2) gives control over security issues and depreciation accounting, (3) requires segregation of merchandising sales accounting, (4) allows utility marginal profits for efficient and economical management. The Governor signed the bill.

Among its other features there was provision for comprehensive control over rates, including initiation of cases by the commission. On failure of the commission to act promptly on rates filed by the companies, the companies may put the schedules into effect after securities have been filed to insure a refund in case any rate increase elements are disallowed. This issuance and sale of securities is put under commission jurisdiction. Sale of a utility's securities by its employees during working hours is forbidden and the companies must not put pressure on employees to buy such securities themselves. The law also provides for control over management and engineering fees charged by holding companies.

Bills sidetracked in many states

Massachusetts, Pennsylvania, New York and Kentucky fussed with a variety of bills, but enacted practically nothing of consequence. Of all the bills introduced in New York only one became a law and that authorizes an existing special commission to continue a survey of interstate power transmission in conjunction with similar commissions in adjoining states and Canadian provinces or else negotiate with the governors, premiers or existing utilities commissions. A bill authorizing the municipalities to form public utility districts for the purpose of generating, distributing and selling electricity failed, as did several others affecting stock control, holding company fees, defining reasonable return and public bidding on security issues. Defeat was meted out to measures ordering horizontal rate reductions and prohibiting the service charge. A bill permitting utility companies to manufacture appliances was vetoed by the Governor.

In Massachusetts the local dealers in electrical appliances helped kill the anti-utility-merchandising bill. Regulation of holding companies was adversely reported. The anti-service-charge measure was also killed, the municipals joining the private utilities in opposition. The Supreme Court refused to outlaw the service charge as desired by the city of Boston in a gas controversy.

A bill prohibiting the lending of money by gas or electric companies was passed and signed. In Pennsylvania Governor Pinchot has never slackened his drive against the utilities. But the legislature in special session killed his measure to institute a state-wide investigation of rates. On April 6 the commission ordered such an inquiry, with emphasis on domestic schedules. It followed a tie vote on Commissioner Woodruff's proposal to fix 5 cents as a top domestic figure. Negotiations for rate reductions will follow in any case where more than 7 per cent is shown to be earned. Six companies have already been chosen for summons. Meanwhile the municipalities are adding their bit to the drive for lower rates by threatening to turn off street lights unless the utilities submit to their demands for reductions.

Kentucky shuns commission regulation

In Kentucky a bill setting up a public service commission passed the Senate, 24 to 1, but the House killed it. The House favored extension of the Railroad Commission jurisdiction to cover other utilities. Certain cities were to be enabled by another bill to engage in operation of utility enterprises, but this was vetoed by the Governor.

If, therefore, any perceptible change is to be discerned in the field of regulation it must be found in the administrative areas and not in effected legislation, not overlooking wholly, however, the significance of new law proposals even though they did fail of passage. There was also the eruption within the ranks of the National Association of Railroad and Utilities Commissioners when Messrs. Maltbie of New York and members of the California and Wisconsin commissions circularized the association membership in protest against certain of its practices and trends. The criticisms were aimed at the rotation of the annual meeting place, the practice of inviting utility executives to participate in the programs and the official indorsement of *Public Utility Reports*. A few weeks later President Murphy replied that the association was a democratic body bound by majority rule. He appealed to the protesting members to participate in future meetings, pointing out that only two of the eight signers of the protest letter had attended any annual convention since 1915. The uprising is interpreted as a perfectly natural schism between conservatives and liberals or between fundamentalists and modernists. It offers an excellent index of the drift in regulatory philosophy.

Negotiation and investigation prominent

Negotiation toward rate adjustment and other aspects of utility operation has been given a stimulus during the year. The New York commission has made that an outstanding element of its regulatory technique. New Jersey has subscribed to the same speeding-up process. As already noted, Pennsylvania has instituted a rate study with negotiation in view as a means of tempering charges. The Virginia commission has been instructed by legislative resolution to make a general rate survey. In Wisconsin the commission can now assess utilities up to one-half of 1 per cent of their gross revenue for costs of investigations even if initiated by the commission.

Resort to emergency provisions of the law led to rate slashes in many Indiana communities by commission order pending a revaluation which would inject the element of lower costs now prevailing for construction. This on the surface appears to depart from the negotiatory philosophy, but does, nevertheless, tend to confirm the contention of the companies for state-wide uniformity in rates.

Investigation is under way in various areas as to the relations of utility operating units with their holding companies. New Hampshire is ascertaining whether the local companies have made loans to the parent companies and at the same time eliciting facts about related transactions. The holding companies have been asked by the Oklahoma board to produce books and records from which more light can be thrown on elements of the costs of local service. Missouri is not so sure as it once was of the benefits to management accruing from the holding companies and questions its occasional past practice of allowing non-resident corporations to hold more than 10 per cent of local utility stocks. The financial support which it was expected the holding company could offer the operating company seems to have faded away during the stress period.

Accounting technique by Wisconsin utilities will be on a more detailed basis in the future as a result of a new order of the commission (see ELECTRICAL WORLD, February 27, 1932). The object is to trace transactions more precisely, provide bases for cost analyses, segregate financing costs and dealings with affiliated companies.

Sentiment on merchandising is shifting

Anti-merchandising sentiment had previously crystallized itself into legislation in two states but no new legislation was passed by the 1932 assemblies. Newspapers in Oklahoma and Kansas have taken up the cudgel against their existing laws because the papers have lost advertising revenue with the shrinkage in the local volume of electrical appliance business that followed enforced abandonment of selling by the utilities. The Oregon commission has been investigating the utility merchandising practices and several others have moved to have the utilities segregate their accounting in this enterprise more specifically. Massachusetts and Mississippi killed bills to prohibit merchandising. In New York a pronouncement of the chairman of the commission says the practice of utility selling is justified only on the ground "that it is a necessary function in order to provide adequate service at reasonable rates." Separate bills should be rendered for service and for merchandise items and service cannot be discontinued for failure to pay merchandise bills. The legal right of gas and electric corporations to deal in electrical appliances is held indisputable.

Briefly, anti-merchandising sentiment has arrived at a turning point. The agitation for such restrictions still exists among electrical and hardware dealers to a considerable extent, but it appears that counter arguments from newspapers and enlightened sales channels are aiding utility compromise toward leaving the problem on the saner foundation of co-operative effort in selling.

It is evident from this recital that the spirit of negotiation and investigation is the principal manifestation of change in the regulatory field. The rate level, the problem of financial relations with parent companies and the matter of merchandising are dominant among the newer topics of activity.

The story would hardly be complete, however, without some index of what has happened by way of court inter-

pretation of regulatory laws. Indiana has been a battleground for rate reductions second only to Pennsylvania. A three-judge tribunal in Indiana held that the municipality is the more proper basis for determining reasonableness of rates than the whole district served by an operating unit. In Wisconsin the propriety of capitalizing utility property which had been financed in part or as a whole by customers was before the state's Supreme Court. Commissioner Lilienthal contends that such property would otherwise have two claims for return against it, one from the security holders and another from the expectation of a rate offset on the part of the customers who advanced the capital for the extension. A Texas district court enjoined the San Antonio Public Service Company from selling appliances, but declined to forfeit its charter or assess a fine against it as urged by the Attorney-General. A 5 per cent return granted by the Connecticut commission in an electric case was decreed by the Superior Court to be inadequate and confiscatory.

Tax situation changed but little

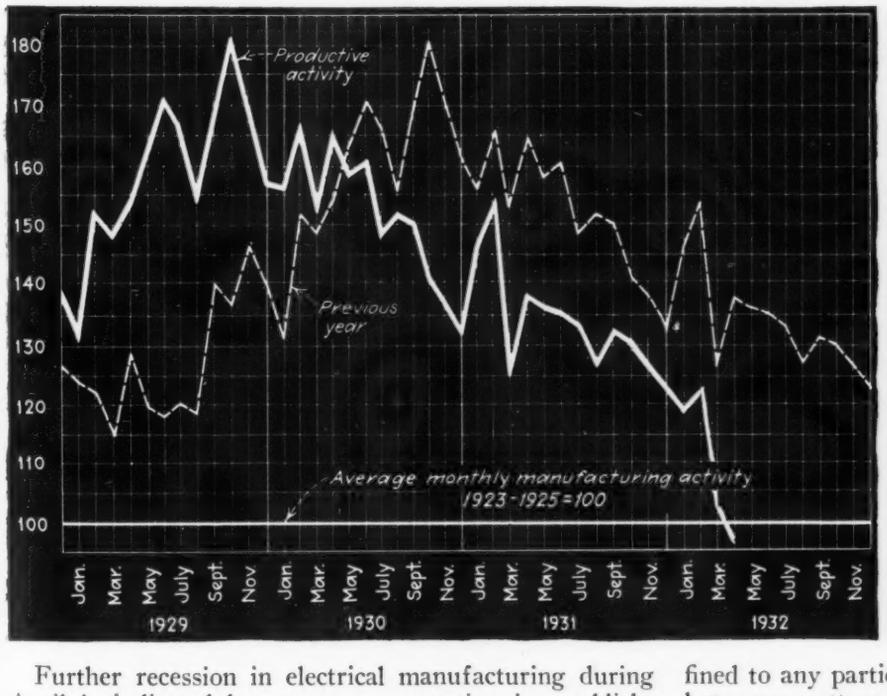
Nor would this résumé be complete without a brief mention of the tax situation. In an article in the April 28, 1932, issue of *Public Utilities Fortnightly* by Dr. Arch D. Schultz it is stated there are now eighteen states which assess from 0.3 to 7.5 per cent on gross receipts of utilities, eleven with a predominant 3 per cent on net and 31 that have some form of franchise tax. Ohio has increased during the year from 1.35 to 2.35 per cent on gross, the proceeds to be applied to the retirement of county relief bonds. Arkansas, whose Legislature did not meet, has seen proposed a bill that would fix a 3 per cent tax on income from all customers paying more than $1.50 per month, the intent being to prevent transmission of the tax to users and to use the proceeds to retire school district indebtedness.

The Mississippi Senate passed a 2 per cent electrical energy sales tax on private companies, but the bill failed in the House. In South Carolina the ½ mill per kilowatt-hour tax remains, a proposal to raise it to 1 mill and apply it so as to exclude exported power having failed. The United States Supreme Court has approved a parallel Idaho situation which was before it. A 2½-mill per kilowatt-hour tax bill failed in Kentucky.

It can therefore be said that fortunately no perceptible change has taken place in the tax situation from the legislative standpoint—fortunately because the multiplicity and magnitude of the tax payments by utilities are in general already as burdensome as they could be without courting disaster.

▼ ▼ ▼

Further Decrease in Electrical Manufacturing



Monthly Index of Electrical Manufacturing Activity

Adjusted to 26 working days

Base: Average Month, 1923-1925

Month	1929	1930	1931	1932
January	131.3	156.2	146.6	120.0
February	151.8	165.2	154.3	122.2
March	148.3	153.0	126.1	102.9
April	154.6	164.9	138.1	95.6
May	163.5	158.0	136.7	.....
June	170.5	160.2	135.2	.....
July	166.6	148.5	133.4	.....
August	155.4	152.2	126.9	.....
September	168.8	150.0	132.6	.....
October	180.6	140.6	130.4	.....
November	169.5	137.5	126.9	.....
December	157.0	132.4	123.5	.....

Further recession in electrical manufacturing during April is indicated by energy consumption in establishments of this group as reported to the ELECTRICAL WORLD. These reports show a rate of activity 7 per cent lower than in March, 22 per cent lower than in February and 20 per cent under that of January after adjustment for differences in the number of working days. Compared with April, 1931, the reduction is equivalent to 32 per cent.

During the latter part of 1931 the smaller companies were, on the whole, losing ground more rapidly than the larger ones; lately that condition has been reversed. As a result the index numbers for the two groups, considered separately, are nearly equal, each being about 5 per cent under the average for 1923-1925.

Contrary to the general trend, about a third of the reports showed an increase compared with March; in a number of cases it was relatively large. These gains were not confined to any particular region or branch of the industry, but were scattered irregularly both as to location and as to product.

For example, one group in the service area of a power company in the central industrial region increased its operations by 15 per cent over March; not far away a larger group on the lines of another company decreased by 14 per cent. Similarly in the manufacture of radio apparatus no definite trend could be discovered, gains as well as losses appearing in the reports. Equipment used by power companies continues low.

In This Financial Crisis

—Holding companies face a test of management and policy.
—Operating companies show average decreases in net of but 0.4 per cent.
—New issues are slightly bettering refinancing needs in current volume.
—Stock yield averages are at 10 per cent.
—Bonds show an average current yield of 6.17 per cent.

ELECTRIC utility organizations, both operating and holding companies, have succeeded well in weathering the financial storms which have been beating upon all industry since the later stages of the depression arrived. There have been exceptions in both the operating and holding groups; there may be further difficulties for some, but more favorably than any other portion of American industry the higher-grade electric utilities stand with their securities selling for better average prices and with their returns to investors better maintained.

Energy output has fallen off some 10 or 12 per cent from last year and is 15 to 18 per cent below 1930 levels. Various economies of labor and operations have been introduced, notably the extensive use of hydro capacity on many properties and the full utilization of interconnection advantages, which partially offset the reduced revenues from various classes of customers.

Declines in the gross and net earnings of operating companies this year, while general, have not been without exceptions where revenues have been maintained. Twenty-one companies show increases for the past twelve months in the tabulations on page 931. Average declines in current earnings figures of operating companies covering the preceding twelve months have been, as reported during 1932, gross earnings, 3.0 per cent; net earnings, 0.4 per cent. Not one of the major operating companies has omitted dividends so far.

A number of operating and holding companies have maintained their earnings and dividend relationships well during this period of stress. The following records of dividends paid with earnings available for that purpose in 1931 show: Bangor Hydro-Electric, $2, $2.50; Edison Electric Illuminating Company of Boston, $13.60 $18.79; Western Massachusetts Companies, $2.40, $2.96; Hart-

Thirteen holding companies analyzed upon the basis of official data in

Holding Companies	1 Current Assets	2 Current Liabilities	3 Capitalization	4 Total Assets	5 Surplus and Reserves	6 Capitalization	7 Gross Revenue	8 Fixed Assets	9 Gross Revenue	10 Net Worth	11 Gross Revenue	12 Capitalization	13 Gross Income	14 Fixed Assets
Management Group														
1. American Light & Traction	0.96	0.699	0.455	0.183	0.184	0.250	0.057	0.058	0.078	0.186	0.593	0.034	0.046	0.081
2. American Water Works & Electric	0.99	0.725	0.320	0.128	0.225	0.163	0.056	0.098	0.071	0.098	0.226	0.022	0.016	0.062
3. Columbia Gas & Electric	1.12	0.668	0.370	0.138	0.177	0.183	0.047	0.060	0.063	0.181	0.528	0.032	0.033	0.080
4. Engineers Public Service	0.91	0.875	0.091	0.153	0.262	0.160	0.056	0.096	0.069	0.078	0.214	0.020	0.012	0.089
5. North American	1.27	0.654	0.468	0.155	0.241	0.221	0.061	0.095	0.087	0.178	0.451	0.043	0.039	0.107
6. North American Light & Power	1.08	0.895	0.060	0.149	0.328	0.151	0.057	0.125	0.057	0.060	0.158	0.019	0.009	0.069
7. Niagara Hudson Power	0.88	0.830	0.134	0.105	0.146	0.118	0.050	0.070	0.056	0.170	0.357	0.025	0.020	0.058
8. Standard Gas & Electric	1.37	0.840	0.149	0.144	0.248	0.159	0.056	0.092	0.062	0.053	0.137	0.012	0.008	0.094
9. United Gas Improvement	2.00	0.755	0.279	0.155	0.228	0.187	0.077	0.113	0.092	0.285	0.575	0.065	0.053	0.106
10. Average	1.18	0.782	0.258	0.146	0.227	0.177	0.057	0.088	0.070	0.143	0.360	0.030	0.026	0.083
Investment Group														
11. Electric Bond & Share	14.70	0.308	2.200	0.066	0.055	0.179	0.050	0.042	0.137	0.514	0.650	0.028	0.088	.....
12. Electric Power & Light	3.03	0.950	0.031	0.065	0.075	0.064	0.063	0.072	0.062	0.333	0.348	0.025	0.021	.....
13. Middle West Utilities	0.20	0.846	0.029	0.087	0.103	0.090	0.079	0.094	0.082	0.585	0.641	0.060	0.053	.....
14. National Power & Light	23.10	0.932	0.067	0.089	0.091	0.082	0.088	0.090	0.081	0.743	0.750	0.067	0.060	.....
15. Average	10.25	0.759	0.582	0.077	0.081	0.101	0.070	0.074	0.090	0.544	0.597	0.045	0.055	.....

Holding Companies	1 Net Profit	2 Gross Revenue	3 Net Profit	4 Gross Income	5 Net Profit	6 Net Worth	7 Net Profit	8 Capitalization	9 Depreciation	10 Gross Revenue
Management Group										
1. American Light & Traction	0.186	0.593	0.034	0.046	0.081	0.699	0.455	0.455	0.183	0.184
2. American Water Works & Electric	0.098	0.226	0.022	0.016	0.062	0.725	0.320	0.320	0.128	0.225
3. Columbia Gas & Electric	0.181	0.528	0.032	0.033	0.080	0.668	0.370	0.370	0.138	0.177
4. Engineers Public Service	0.078	0.214	0.020	0.012	0.089	0.875	0.091	0.091	0.153	0.262
5. North American	0.178	0.451	0.043	0.039	0.107	0.654	0.468	0.468	0.155	0.241
6. North American Light & Power	0.060	0.158	0.019	0.009	0.069	0.895	0.060	0.060	0.149	0.328
7. Niagara Hudson Power	0.170	0.357	0.025	0.020	0.058	0.830	0.134	0.134	0.105	0.146
8. Standard Gas & Electric	0.053	0.137	0.012	0.008	0.094	0.840	0.149	0.149	0.144	0.248
9. United Gas Improvement	0.285	0.575	0.065	0.053	0.106	0.755	0.279	0.279	0.155	0.228
10. Average	0.143	0.360	0.030	0.026	0.083	0.782	0.258	0.258	0.146	0.227
Investment Group										
11. Electric Bond & Share	0.514	0.650	0.028	0.088	.....	0.308	2.200	0.179	0.066	0.055
12. Electric Power & Light	0.333	0.348	0.025	0.021	.....	0.950	0.031	0.064	0.065	0.075
13. Middle West Utilities	0.585	0.641	0.060	0.053	.....	0.846	0.029	0.090	0.087	0.103
14. National Power & Light	0.743	0.750	0.067	0.060	.....	0.932	0.067	0.082	0.089	0.091
15. Average	0.544	0.597	0.045	0.055	.....	0.759	0.582	0.101	0.077	0.081

In the preparation and analysis of data in this presentation the annual reports of the companies involved, for the year 1931, have been used as the source of figures, but the terms appearing in those reports are not necessarily those whose relationships have been compared in this study. The extreme divergence of balance sheet and income statement terms and definitions necessitated the use of a single set of definitions, which, roughly, are as follows:

Current Assets—Cash, notes and accounts receivable, accrued dividends and interest receivable, materials and supplies, prepayments.

Current Liabilities—Notes and accounts payable, interest and dividends payable, accrued taxes and interest.

Fixed Assets—Property and plant, investments in stocks and bonds held independently of marketable investments, deposits with trustees.

Net Worth—Total assets less actual liabilities (excluding reserves, surpluses, stock outstanding).

Capitalization—Outstanding bonds and stocks and minority interests.

Total Assets—Total as shown on balance sheet.

Shares Common Stock—Outstanding as of December 31, 1931.

Working Capital—Current assets less current liabilities.

Surplus + Reserves—Capital and earned surpluses and reserve accounts.

Gross Revenue—Gross operating revenue plus all other income (not including profits on sale of property).

Gross Income—Income after deduction from gross revenue of operating expenses taken to include taxes, depreciation, maintenance, operating, etc.

Income Deductions—Interest, amortization and debt discount

ford Electric Light Company, $1.11, $1.24; Connecticut Power Company, $1, $1.14; New England Power Association, $2, $3.33; Cities Service Light & Power, $0.80, $0.63; Federal Light & Traction $2.07, $3.41; Niagara Hudson Power, $0.40, $0.51; Central Hudson Gas & Electric Company, $0.80, $1.54; North American Company, $1.19, $3.41; Cleveland Electric Illuminating Company, $1.96, $2.87; Public Service Corporation, $3.40, $3.85; and United Corporation, $0.72, $0.75.

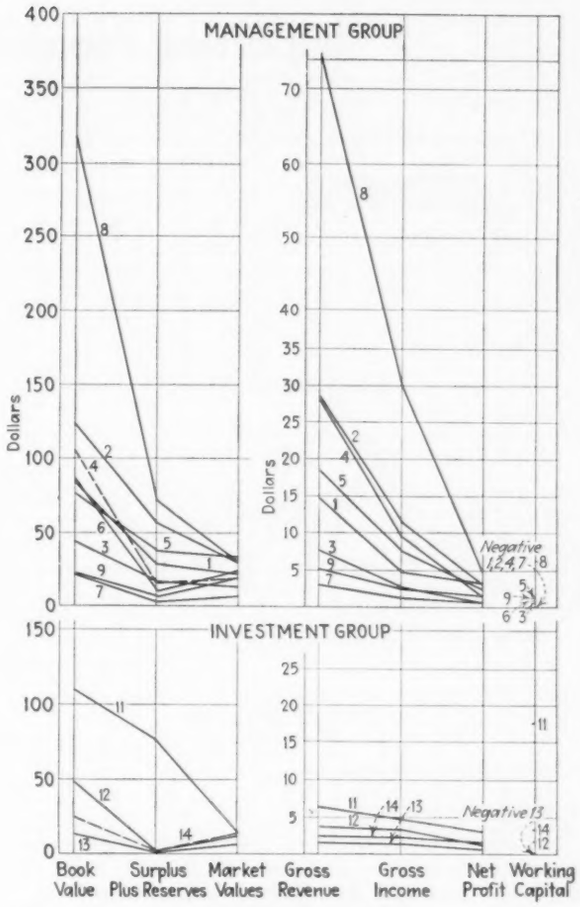
Security markets do not reflect investment values

The ELECTRICAL WORLD indexes of utility stock and bond market prices have slumped badly. The average price of 50 selected power and light common stocks listed in an accompanying table has fallen from nearly $40 a share as of the first of this year to $24.20. The high point, 1929, was $115 and the average for 1931 was about $55.

The yield on this whole group of 50 stocks, twelve of which no longer pay dividends, is 8.30 per cent. Yield on the dividend payers only is 10.93 per cent.

Bond prices have dropped too. From an average of 97.5 at the beginning of the year they have fallen to 88.7 as of April 1. Average for 1931 was just under par. Current yields at present prices on this list of securities are also indicated in an accompanying tabulation; the average current yield is 6.17 per cent.

Undoubtedly both common stock and bond yields of utilities are such as to place these securities in a very favorable investment class at this period and market prices are certain to reflect changed business conditions quickly when they arrive.



Unit values per share of common stock outstanding for thirteen holding companies

Though the refunding problem of 1932 loomed large at the first of the year with an estimated total of $507,354,000, the largest ever recorded for the electric utilities, by the end of April a total of $144,300,000 had been floated and rights to purchase bonds totaling $42,066,000 offered likewise. Thus a presumable sum of $186,000,000 was secured in four months on a year's total of $507,354,000, or somewhat more than the estimated refunding needs. In a number of instances earnings, sometimes to the impairment of dividend payments, have been used to pay off bank loans and maturing obligations.

Rates of return demanded by investors on public offerings in the utility field this year have varied from 5 per cent on a Kansas City Power & Light issue to 8.25 per cent on a Virginia Public Service offering. The average yield to muturity, at the offering prices of the issues listed by ELECTRICAL WORLD, has been 5.90 per cent for the first four months of 1932, as compared with an average yield for 1931 offerings of 4.67 per cent.

Holding companies at the crossroads

Most pressing of financing problems is the future of the holding company. The fact that its capital structure is based upon common stock dividends of underlying properties makes it keenly sensitive to fluctuations in earnings of underlying properties, for, as illustrated in

in 1931 annual reports

Times Prior Charges Earned	% Change in Gross Revenue 1930-31	% Change in Net Profit in 1930-31	Times Common Dividend Earned	Book Value per Share of Common	Working Capital per Share of Common	Surplus and Reserves per Share of Common	Market Value per Share Jan. 1, 1932	Gross Revenue per Share of Common	Gross Income per Share of Common	Net Profit per Share of Common
15	16	17	18	19	20	21	22	23	24	25
2.46	— 8.18	—14.70	1.16	84.80	Neg.	28.50	21.0	15.60	4.88	2.90
1.29	— 7.60	— 9.60	0.93	123.00	Neg.	56.00	29.0	28.50	12.40	2.80
1.80	— 6.33	—19.90	0.76	44.00	0.66	15.70	13.0	7.80	2.68	1.42
1.27	— 2.98	—17.70	1.03	105.00	Neg.	15.50	18.0	27.40	10.10	2.10
1.82	—10.80	—15.80	0.96	76.50	1.39	40.60	33.0	18.40	7.28	3.30
1.19	— 1.21	— 3.47	0.70	85.50	0.81	11.10	24.0	28.00	10.65	1.69
1.56	0.00	—13.70	1.24	20.60	Neg.	3.40	7.0	3.00	1.42	0.51
1.16	— 8.30	—33.40	0.62	318.00	6.08	71.00	28.0	75.50	29.30	4.02
2.36	— 3.08	— 5.26	1.21	22.50	1.13	7.67	19.0	5.10	2.53	1.45
1.66	— 5.38	—14.83	0.96	.....	.....	.....	.....	.....	.....	.....
2.84	— 6.38	—10.45	2.19	110.00	17.30	76.00	13.0	6.14	4.70	3.05
1.54	— 3.33	—25.21	1.79	48.40	1.93	1.77	12.0	3.63	3.47	1.21
2.78	— 4.13	—14.30	1.14	14.50	Neg.	0.48	7.0	1.47	1.33	0.86
4.01	—11.50	—15.80	1.67	25.00	3.40	1.85	14.0	2.25	2.23	1.65
2.79	— 6.33	—16.44	1.70	.....	.....	.....	.....	.....	.....	.....

expense, preferred dividends, charges of minority interests, earnings applicable to minority common stocks, etc.

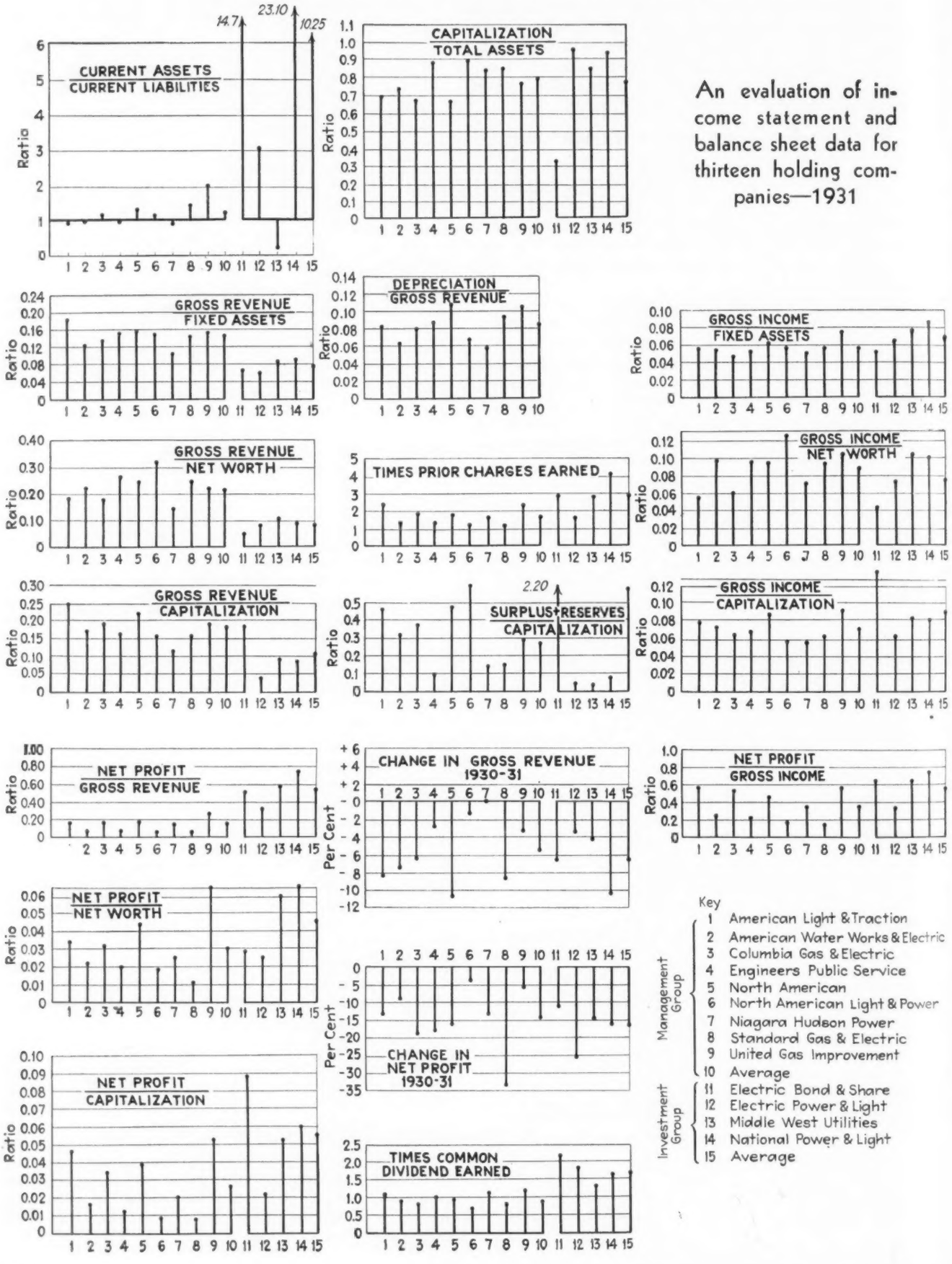
Net Profit—Balance available from income for surplus before deducting common stock dividends of holding company (gross income less income deductions).

Prior Charges Earned—Gross income divided by income deductions.

In the management group (companies 1 to 9) income statements and balance sheets are based upon consolidated reports, including subsidiaries and the top holding company. In the investment group (companies 11 to 14) only the holding company figures are available. For this reason the two groups have been used to avoid meaningless comparisons. The definitions made do not refer to the functions exercised by the companies themselves with entire accuracy or complete distinction.

Important Holding Companies Compared

An evaluation of income statement and balance sheet data for thirteen holding companies—1931



an accompanying figure a certain over-all return on an operating property means a higher return on the common stock of the operating company and a still higher return on the common stock of the holding company, but let the over-all return on the underlying property fall and the decreases are multiplied to the detriment of holding company earnings. Such fluctuations necessitate the maintenance of an adequate surplus by holding companies to level peaks and valleys in the earnings from good years and bad.

In accompanying tables and charts income statement and balance sheet figures have been compared for thirteen important holding companies. While generalized conclusions are not justified in regard to the relationships of various companies in connection with the same factors, it is interesting to note the reflection of executive policies as to payments of dividends, maintenance of reserves and liquid funds.

Foremost among holding company problems is the question of security prices and their adjustment on the books of these organizations to represent fair values. That today's market prices are true indexes of value would be conceded by few. That the cost of the securities to the holding company is accurate would be de-

Earnings of Operating Companies Dropped but Little in 1931-1932

	1932	1931	Per Cent Increase	Operating Ratio 1932	Operating Ratio 1931
Alabama Power (Year ended January 31)					
Gross earnings	$17,670,795	$17,904,444	— 1.4	44	43
Net earnings	9,933,714	10,186,889	— 2.5	..	..
Arkansas Power & Light (Year ended January 31)					
Gross earnings	8,144,437	8,717,249	— 7.0	50	55
Net earnings	4,038,908	3,951,060	2.0	..	..
Bangor Hydro-Electric (Year ended February 29)					
Gross earnings	2,231,887	2,241,097	— 0.4	44	45
Net earnings	1,257,396	1,234,581	1.8	..	..
Birmingham Electric (Year ended January 31)					
Gross earnings	7,250,331	8,144,629	—11.0	69	70
Net earnings	2,219,887	2,518,046	—12.0	..	..
Carolina Power & Light (Year ended January 31)					
Gross earnings	9,755,160	8,966,012	9.0	50	45
Net earnings	4,863,559	4,955,285	— 2.0	..	..
Central Arizona Light & Pwr. (Year ended February 29)					
Gross earnings	3,092,188	3,227,537	— 4.2	57	54
Net earnings	1,311,688	1,483,253	—11.5	..	..
Consumers Power (Year ended February 29)					
Gross earnings	30,640,073	32,299,904	— 5.1	42	44
Net earnings	17,888,851	17,989,869	— 0.6	..	..
Dallas Power & Light (Year ended February 29)					
Gross earnings	5,365,799	5,383,042	— 0.3	45	48
Net earnings	2,921,291	2,777,576	5.2	..	..
Detroit Edison (Year ended March 31)					
Gross earnings	48,136,786	52,146,433	— 7.7	65	67
Net earnings	16,688,419	16,797,994	— 0.7	..	..
Florida Power & Light (Year ended January 31)					
Gross earnings	11,553,272	11,632,142	— 1.0	50	52
Net earnings	5,796,426	5,622,726	3.0	..	..
Houston Electric (Year ended January 31)					
Gross earnings	2,657,445	3,064,229	—13.3	72	71
Net earnings	726,093	873,732	—16.9	..	..
Houston Lighting & Power (Year ended January 31)					
Gross earnings	8,569,498	8,785,770	— 2.0	46	52
Net earnings	4,642,450	4,209,847	10.0	..	..
Idaho Power (Year ended January 31)					
Gross earnings	4,336,414	4,182,753	3.7	48	48
Net earnings	2,242,189	2,179,881	2.9	..	..
Iowa Public Service (Year ended March 31)					
Gross earnings	4,275,727	4,523,674	— 5.4	55	59
Net earnings	1,928,252	1,832,622	5.2	..	..
Kansas City Power & Light (Year ended February 29)					
Gross earnings	14,678,051	14,793,742	— 0.8	44	45
Net earnings	8,286,421	8,169,791	1.4	..	..
Kansas Gas & Electric (Year ended January 31)					
Gross earnings	5,623,822	5,944,961	— 5.0	50	51
Net earnings	2,779,266	2,923,523	— 5.0	..	..
Louisiana Power & Light (Year ended February 29)					
Gross earnings	6,031,566	6,240,342	— 3.3	50	52
Net earnings	3,007,032	2,995,674	0.4	..	..
Louisville Gas & Electric (Year ended February 29)					
Gross earnings	10,397,687	10,607,993	— 2.0	46	48
Net earnings	5,629,622	5,546,692	1.5	..	..
Memphis Power & Light (Year ended January 31)					
Gross earnings	6,780,990	6,896,458	— 2.0	58	59
Net earnings	2,854,019	2,823,554	1.0	..	..
Minnesota Power & Light (Year ended February 29)					
Gross earnings	5,987,375	6,479,331	— 7.5	37	37
Net earnings	3,776,310	4,052,399	— 6.8	..	..
Mississippi Power & Light (Year ended February 29)					
Gross earnings	4,988,907	5,058,439	— 1.4	62	66
Net earnings	1,890,106	1,724,472	9.6	..	..
Montana Power (Year ended January 31)					
Gross earnings	8,660,026	9,911,869	—13.0	40	40
Net earnings	5,170,777	5,917,990	—13.0	..	..
Nebraska Power (Year ended January 31)					
Gross earnings	6,802,351	6,647,795	2.0	47	49
Net earnings	3,595,051	3,391,263	6.0	..	..
Nevada-California Electric (Year ended February 29)					
Gross earnings	5,641,558	5,691,671	— 0.9	48	48
Net earnings	2,918,952	2,980,720	— 2.1	..	..
New Orleans Public Service (Year ended January 31)					
Gross earnings	17,094,850	17,774,847	— 4.0	63	64
Net earnings	6,291,821	6,331,805	— 1.0	..	..
Northern States Power (Year ended February 29)					
Gross earnings	33,890,289	33,302,796	1.8	48	50
Net earnings	17,548,455	16,622,970	2.0	..	..
Northwestern Electric (Year ended January 31)					
Gross earnings	3,593,670	3,642,523	— 1.3	55	60
Net earnings	1,617,347	1,450,584	11.4	..	..
Oklahoma Gas & Electric (Year ended February 29)					
Gross earnings	11,767,536	13,759,249	—14.5	50	53
Net earnings	5,967,588	6,413,756	— 7.0	..	..
Pacific Power & Light (Year ended January 31)					
Gross earnings	4,495,615	4,478,409	0.0	52	52
Net earnings	2,128,214	2,156,015	— 1.0	..	..
Pennsylvania Power & Light (Year ended January 31)					
Gross earnings	34,885,499	31,416,465	11.0	48	50
Net earnings	18,074,710	15,815,343	14.0	..	..
Philadelphia Electric (Three mos. ended Mar. 31)					
Gross earnings	17,435,362	17,951,574	— 2.9	51	52
Net earnings	8,584,786	8,529,681	0.6	..	..
Public Service Corporation of New Jersey & subs* (Year ended March 31)					
Gross earnings	135,202,427	138,527,233	— 2.4	66	68
Net earnings	45,338,738	44,044,825	2.9	..	..
San Diego Consolidated Gas & Electric (Year ended February 29)					
Gross earnings	7,602,236	7,425,918	2.4	48	49
Net earnings	3,904,546	3,785,646	3.1	..	..
Sioux City Gas & Electric (Year ended March 31)					
Gross earnings	3,309,405	3,397,765	— 2.6	48	47
Net earnings	1,745,035	1,789,703	— 2.5	..	..
Southern California Edison (Year ended March 31)					
Gross earnings	40,156,909	41,158,204	— 2.0	32	32
Net earnings	27,164,739	28,110,463	— 3.0	..	..
Tennessee Electric Power (Year ended February 29)					
Gross earnings	13,469,038	14,504,785	— 7.1	49	52
Net earnings	6,901,941	6,889,837	0.2	..	..
Texas Electric Service (Year ended January 31)					
Gross earnings	8,202,277	9,080,679	—10.0	47	48
Net earnings	4,342,098	4,677,800	— 7.0	..	..
Texas Power & Light (Year ended January 31)					
Gross earnings	9,965,282	9,948,647	0.0	48	49
Net earnings	5,148,676	5,062,573	2.0	..	..
Utah Power & Light (Year ended January 31)					
Gross earnings	10,557,541	11,160,487	— 5.0	48	45
Net earnings	5,555,986	6,117,744	— 9.0	..	..
Washington Water Power (Year ended January 31)					
Gross earnings	8,683,599	9,489,343	— 8.0	48	44
Net earnings	4,558,012	5,308,495	—14.0	..	..
Wisconsin Public Service (Year ended February 29)					
Gross earnings	5,460,954	5,562,899	— 1.8	55	58
Net earnings	2,411,580	2,294,256	5.1	..	..

* Operating expenses include depreciation.

Note—Gross earnings here reported are for earnings from operations. Net earnings are gross earnings less taxes, operating and maintenance expense.

Bond Offerings of 1932

Name of Company	Amount of Issue (Par Value)	Date of Issue	Period (Years)	Class	Interest Rate	Price	Per Cent Yield
Kansas Power & Light Co.	$7,500,000	January	15	First and refunding mortgage gold bonds, series C	6	91½	6.90
Kentucky Utilities Co.	1,800,000	January	25	First lien gold bonds, series J	7	100	7.00
New York Edison Co.	25,000,000	January	20	First lien and refunding mortgage gold bonds, series C	5	97	5.25
Brooklyn Edison Co., Inc.	25,000,000	February	20	General mortgage gold bonds, series E	5	97	5.25
Central Illinois Public Service Co.	1,500,000	February	25	First mortgage bonds	6	88	7.02
Duquesne Light Co.	5,000,000	March	25	First mortgage gold bonds	4½	92	5.06
Blackstone Valley Gas & Electric Co.	2,000,000	March	20	Mortgage and collateral trust gold bonds, series B	5	91¾	5.69
Virginia Electric & Power Co.	4,000,000	March	10	Secured convertible gold bonds	5½	95½	6.10
Syracuse Lighting Co.	5,000,000	March	25	First and refunding mortgage gold bonds, series B	5	95	5.35
Utica Gas & Electric Co.	2,000,000	March	20	General mortgage gold bonds, series E	5	93	5.55
Virginia Public Service Co.	2,000,000	March	20	First mortgage and refunding gold bonds, series C	6	78	8.25
Southern California Edison Co., Ltd.	10,000,000	March	22	Refunding mortgage gold bonds	5	96	5.30
Pennsylvania Power Co.	2,500,000	March	24	First mortgage gold bonds	5	95	5.35
Public Service Co. of Indiana	7,500,000	March	20	First mortgage and refunding bonds, series G	6	87	7.25
Kansas City Power & Light Co.	5,250,000	April	29	First mortgage gold bonds	4½	92.37	5.00
Columbus Railway, Power & Light Co.	4,500,000	April	10	Secured convertible gold bonds	5½	94	6.31
Edison Electric Illuminating Co. of Boston	10,000,000	April	1	Coupon gold notes	4½	99.76	4.75
	20,000,000	April	3	Notes	5	98.79	5.44
Narragansett Electric Co.	3,750,000	April	25	First mortgage gold bonds, series B	5	93¼	5.50
Total	$144,300,000						
Rights	42,066,808						

Status of Utility Common Stocks

(Basis of ELECTRICAL WORLD weekly market chart)

Name of Company	Dividend ($)	Market Price (May 1)	Current Yield %
American & Foreign Power	....	3	.....
American Cities Power & Light, A	3	18	16.66
American Commonwealths Power, A	....	5/16	.....
American Commonwealths Power, B	....	1/8	.....
American Gas & Electric	1+4% stk.	25	8.00
American Light & Traction	2.50	17	14.70
American Power & Light	....	9	.....
American States Public Service, A	....	2	.....
American Superpower, A	....	2	.....
American Waterworks & Electric	3	20	15.00
Associated Gas & Electric, A	5% stk.	3	5.00
Cities Service	0.30+6% stk.	4	13.50
Cleveland Electric Illuminating	1.60	25	6.40
Columbia Gas & Electric	1.00 stk.	8	12.50
Commonwealth & Southern	0.30	3	10.00
Commonwealth Edison	8	70	11.42
Consolidated Gas, Elec. Lt. & Pwr. of Baltimore	3.60	50	7.20
Consolidated Gas of New York	4	52	7.69
Detroit Edison	8	82	9.74
Duke Power	5	63	7.95
Eastern States Power, B	....	1	.....
Edison Electric Ill. of Boston	13.60	135	10.00
Electric Bond & Share	6% stk.	13	6.00
Electric Power & Light	1	7	14.28
Engineers Public Service	1.40	10	14.00
Federal Light & Traction	1.50+4% stk.	10	19.00
Long Island Lighting	0.60	15	4.00
Louisville Gas & Electric, A	1.75	17	10.28
Middle West Utilities	....	½	.....
National Electric Power, A	....	2	.....
National Power & Light	1	12	8.33
National Public Service, A	....	3	.....
Niagara Hudson Power	0.40	4	10.00
North American	10% stk.	23	10.00
Northern States Power, A	8	50	16.00
Pacific Gas & Electric	2	27	7.40
Pacific Lighting	3	30	10.00
Pennsylvania Water & Power	3	42	7.14
Philadelphia Company	0.90	10	9.00
Public Service of No. Ill.	8	55	14.54
Public Service of New Jersey	3.40	43	7.90
Southern California Edison	2	25	8.00
Standard Gas & Electric	3.50	16	21.87
Standard Power & Light	2	10	20.00
Tampa Electric	2.24	21	10.66
United Corporation	0.40	6	6.66
United Gas Improvement	1.20	17	7.05
United Light & Power, A	....	3	.....
Utilities Power & Light, A	....	3	.....
West Penn Electric, A	7.00	40	17.50
Average yield total list			8.30%
Average yield dividend payers only			10.93%

Status of Utility Bonds

(Basis of ELECTRICAL WORLD monthly market chart)

	Interest Rate	Maturity Date	Market Price	Current Yield %
American Power & Light	6	2016	63	9.52
American Water Works & Electric	5	1934	82	6.09
American Water Works & Electric	6	1975	60	10.00
Brooklyn Edison (Series A)	5	1949	104	4.80
Buffalo General Electric	5	1939	103	4.85
California Gas & Electric	5	1937	101	4.95
Connecticut Railway & Lighting	4½	1951	87	5.17
Consolidated Gas of New York	5½	1945	104	5.28
Consumers Power	5	1952	102	4.90
Detroit Edison	5	1955	101	4.95
Detroit Edison	5	1933	101	4.95
Detroit Edison	5	1949	102	4.90
Duquesne Light	4½	1967	98	4.59
Federal Light & Traction	6	1942	70	8.57
Federal Light & Traction	6	1954	50	12.00
Federal Light & Traction	5	1942	67	7.46
Florida Power & Light	5	1954	69	7.24
Illinois Power & Light	5½	1954	65	8.46
Long Island Lighting	6	1945	92	6.52
Louisville Gas & Electric	5	1952	98	5.10
Metropolitan Edison (Series C)	5	1953	95	5.26
Milwaukee Electric Ry. & Lt. (Series B)	5	1961	79	6.32
Montana Power (Series A)	5	1943	85	5.88
New Orleans Public Service (Series A)	5	1952	65	7.69
New York Edison (Series A)	6½	1941	110	5.90
New York Edison	5	1944	104	4.80
North American	5	1961	76	6.57
Northern States Power (Series B)	6	1941	101	5.94
Northern States Power	5	1941	96	5.20
Ohio Power	5	1952	93	5.37
Ohio Public Service (Series A)	7½	1946	99	7.57
Ohio Public Service	7	1947	90	7.77
Pacific Gas & Electric	5	1942	102	4.90
Penn Central Light & Power	4½	1977	74	6.08
Penn Ohio Edison	6	1950	67	8.95
Portland General Electric	5	1935	96	5.20
Rochester Gas & Electric	5½	1948	96	5.72
Rochester Gas & Electric	4½	1977	90	5.00
San Antonio Public Service	6	1952	84	7.14
Sierra & San Francisco Power	5	1949	90	5.55
Southern California Edison	5	1951	99	5.05
Southern California Edison	5	1954	98	5.10
St. Joseph Ry., Lt., Ht. & Pwr.	5	1937	78	6.41
Syracuse Lighting	5	1957	96	5.20
Tennessee Electric Power	6	1947	92	6.52
Union Electric Light & Power (Ill.) (Series A)	5½	1954	101	5.44
Union Electric Light & Power (Mo.)	5	1932	101	4.95
Utah Power & Light	5	1944	73	6.84
Utica Gas & Electric	5	1957	100	5.00
West Penn Power (Series A)	5	1946	101	4.95
Average current yield				6.17%

batable likewise, yet several companies hold their investment accounts "at cost," while others have depreciated them wholly or in part. Those organizations unable to make any necessary adjustment without seriously upsetting, or at least shaking, their structure are of course in the less favorable position. This is an insistent problem for the coming months. Earnings are far less a subject of concern, for eight holding companies of the thirteen analyzed herewith continued to show common dividends to be earned; one more than 2.00 times, though net profits have fallen on the average nearly 15 per cent and in not a single case failed to decline.

In comparing ratios of net profits to capitalization for various companies the extreme divergence of policy is readily discernible. Bond & Share, with a figure of nearly 9 per cent, tops the list, with some lower than 1 per cent.

Depreciation policies vary widely too, for the range of charge is from about 5 to 11 per cent of gross revenue, with an average of about 8 per cent.

Prior charges are in all examples earned, with at least a margin of unity to spare; in one case the margin is more than four times.

Capitalization to total assets ratios bring up the question of investment values once more. Where unity is approached, the situation, unless balance sheet write-downs have already been made, is a danger point, for sooner or later some adjustment must be made.

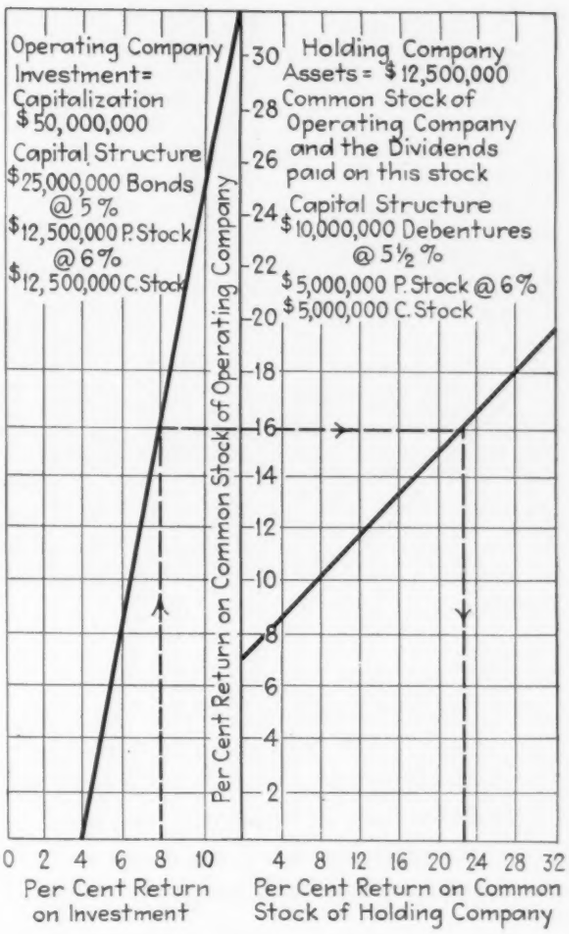
The wisdom of conserving resources for lean days and years is well illustrated in the surplus plus reserves to capitalization relationships, for the lean times scarcely are likely to touch the company well fortified with undistributed profits.

Values per share of common figures as plotted on an accompanying chart are not strictly comparable because of the variable relationship of shares outstanding to other corporate elements, but in seven instances, according to December 31, 1931, figures, market prices were higher than the figures represented by surplus plus reserves alone, but in all cases less than book values.

A wide variation in the gross revenues necessary to produce fairly comparable gross incomes and more strictly comparable net profits is possibly due to the character of operations of underlying properties; thus, some top companies have gas, electricity, railway, oil and steam subsidiaries, while others have only some of these, with consequent varying elements of profitableness.

Continued declines in security market prices may further accent some obvious weaknesses in statistical elements. Working capital, assuming proprietorship securities to be as a matter of policy unmarketable, is as of December 31, 1931, a negative quantity for five of these companies. This does not imply hazardous conditions, but rather points to a situation of interest. As of December 31, 1931, for example, Middle West Utilities had a ratio of current assets to current liabilities of but 0.200, but was still functioning. No other company approaches this point, the lowest being close indeed to unity.

On the whole, the electric light and power industry has fared well indeed. Its future is the future of America, but now, as has so often been said in the past, it is in an unrivaled position to move forward, whenever the forward movement is resumed, due to the character of the services rendered, the universality of their acceptance, the soundness of the basic organizations and the proved sustained earning power of the industry.



How operating company revenues multiply in the holding company set-up

As a simpler example of the principle illustrated above, assume an operating company with a capital set-up consisting of 60 per cent bonds and preferred stock with an average interest and preferred dividend rate of 6 per cent. Then, if the over-all return on a $10,000,000 property is 8 per cent, we have, roughly,

Total net for security holders

$$\$10,000,000 \times 0.08 = \$800,000$$

Total required for bonds and preferred stock

$$\$6,000,000 \times 0.06 = \$360,000$$

Balance for common-stock holders

$$\$800,000 - \$360,000 = \$440,000$$

which yields on $4,000,000 of common stock 11 per cent.

Repeated in holding company set-up the $4,000,000 of common stock assets becomes on

Holding company bonds and preferred stock

$$\$4,000,000 \times 0.06 \times 0.06 = \$144,000$$

Balance for common-stock holders

$$\$440,000 - \$144,000 = \$296,000$$

which yields on $1,600,000 of common ($4,000,000 × 0.4)

$$\frac{\$296,000}{\$1,600,000} = 18.5 \text{ per cent}$$

Under depression conditions, however, with the operating property yielding not 8 per cent but 6 per cent, the figures become.

Balance for operating company common-stock holders

$$\$660,000 - \$360,000 = \$240,000$$

and for holding company common-stock holders

$$\$240,000 - \$144,000 = \$96,000$$

which is a yield of but 6 per cent. Thus a drop from 8 to 6 per cent in operating company return, in this example, means 6 per cent instead of 11 available for operating company common-stock holders and 6 per cent instead of 18.5 available for dividends on holding company common. In this example, and in the illustration above, no allowance has, of course, been made for necessary holding company expenses. These elements are intended only to indicate, quite roughly, a fundamental principle.

Economical Generation

Gilbert Station
Associated Gas & Electric Company

Developments indicate many stations can operate on 12,000 B.t.u. per kw.-hr. with total station cost under 4 mills.

Improvements in equipment and simplicity in layouts.

Present practices and trends.

ABOUT 30 per cent of the electrical energy generated by utilities comes from water power. Of the 70 per cent produced from fuel about 80 per cent comes from coal. These percentages have changed only slightly in the past few years.

At this time about 40 per cent of the investment of utilities is in power stations and this estimated amount of $5,000,000,000 may be divided roughly into hydro capacity of 8,500,000 kw., involving an investment of about $2,000,000,000, and steam station capacity of 25,000,000 kw., involving an investment of $3,000,000,000.

Opinion holds that the future of power generation rests largely upon the growth of fuel-burning stations, except for some outstanding hydro developments such as the St. Lawrence, Columbia River and the Tennessee River. The relative costs, transmission distances and remaining undeveloped water powers in load areas point toward a relatively greater use of steam plants in the future.

Very great progress has been made in steam station development. A significant statement in this connection is that the output from coal-burning plants has increased about thirteen times from 1902 to 1930, yet coal consumption increased about four times. Since 1920 there has been an increase in the use of higher pressures and temperatures, in the size and rating of units, in increased efficiency of equipment and in better station designs. The over-all results have been remarkable, considering the departures in practice and the degree in which the art has advanced experimentally.

Today at least fifteen fuel-burning stations operate on an annual basis of less than 15,000 B.t.u. per kilowatt-hour. One of the latest 1,200-lb. pressure stations with a load factor of about 85 per cent operates at about 11,900 B.t.u. per kilowatt-hour. A recently built 600-lb. pressure station operating on an annual load factor of only 60 per cent operates on 12,800 B.t.u. per kilowatt-hour. Eight or ten stations in the 400-600-lb. pressure range operate at about 13,500 B.t.u. per kilowatt-hour, with load factors ranging from 45 to 60 per cent.

Thus a survey of operating results shows that 400-600-1,200-lb. stations operate with a very small fuel consumption, and a further study of the costs shows that a very small differential, in the order of $5 a kilowatt, measures the difference in investment cost in this range of pressure. Operating convenience, adaptability to load, maintenance and fuel costs are deciding factors in the choice of station pressure. A recent survey of the best-informed and most-experienced station engineers indicates a decided preference for designs of new stations based on 600-lb. pressure, 800 deg F. steam pressure and the regenerative cycle without reheat to give simple unit-type layouts. Some preliminary estimates indicate that this type of station may now be built for about $75 a kilowatt to produce energy at about 3½ mills per kilowatt-hour at ordinary load factors.

Single vs. multiple stations

The use of the two-fluid type of station, such as mercury-water and diphenol-water, offer thermal gains as demonstrated in operating stations with performances of about 10,000 B.t.u. per kilowatt-hour, but, at the present time, first cost, the limited size of equipment available and the operating complexity of these stations do not make them relatively more economical and advantageous than the standard steam station. Also, despite the success of semi-experimental installations, there is little prospect of a widespread use of higher-pressure and higher-temperature steam stations, for example, 3,000 lb., 1,000 deg. F. Thus, the next group of stations promise to be unit type designs, using large units at high ratings with simple design layouts, whereby any unit is put on or off the system as a unit. Since both boilers and turbines now have the same availability factors of about 90 per cent, over-all economy, operating simplicity and flexibility result from this practice.

On large power systems several stations are favored as against a single large station. There is some gain in

thermal efficiency and some saving in operating and construction costs with a single station, but the multiple station design requires less reserve capacity on the system, gives greater flexibility in meeting system and load changes and makes possible savings in transmission costs. Undoubtedly better service and greater over-all flexibility and economy apply to the use of multiple stations.

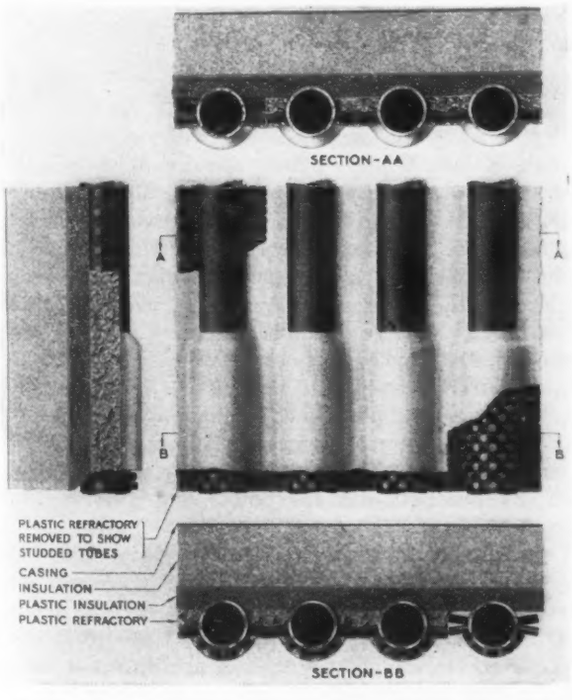
The cost of power stations is a variable, influenced by such elements as cost of site, location, load conditions and the opinion and judgment of designers as reflected in the selection of equipment and in its layout in the station. The engineers fix the temperature, pressure, size of units, number of units, fuel-burning arrangements, auxiliary layout and the general features that affect the operating economy of the station. Some of the ranges in costs in terms of the total cost of station are as follows:

Site cost and preparation	2 to 9
Condensing water tunnels, etc.	2 to 10
Fuel and ash handling and storage	2.5 to 8
Heat production, conversion equipment	40 to 65
Auxiliary apparatus and equipment	6 to 12

Thus each element of cost of a station is subject to a wide variation, even though the total cost of stations may be less variable. A station built for $75 a kilowatt, therefore, does not necessarily represent a better engineering accomplishment than one built for $100 a kilowatt. Generalized statements of total cost of stations per unit of capacity must be used with caution.

Normal procedure in station designs for a system is based upon a territorial and load analysis as a start. The next step is to select the simplest and most efficient standard equipment available to form a flexible station assembly with a minimum of complexity introduced to meet conditions that may, but probably never will, be encountered. This leads to the unit boiler-turbine-generator assembly with independent station units.

Experience indicates that it is better to build for present conditions very largely, because investments made to anticipate future loads are apt to be uneconomical both because of load changes and because of advances in station equipment. A further factor is to design the station to meet the system operating requirements most economically and most flexibly.



Studded tube screens are used to reduce slagging

New type of water deflector and load-regulating mechanism
Tiger Creek station of Pacific Gas & Electric Company

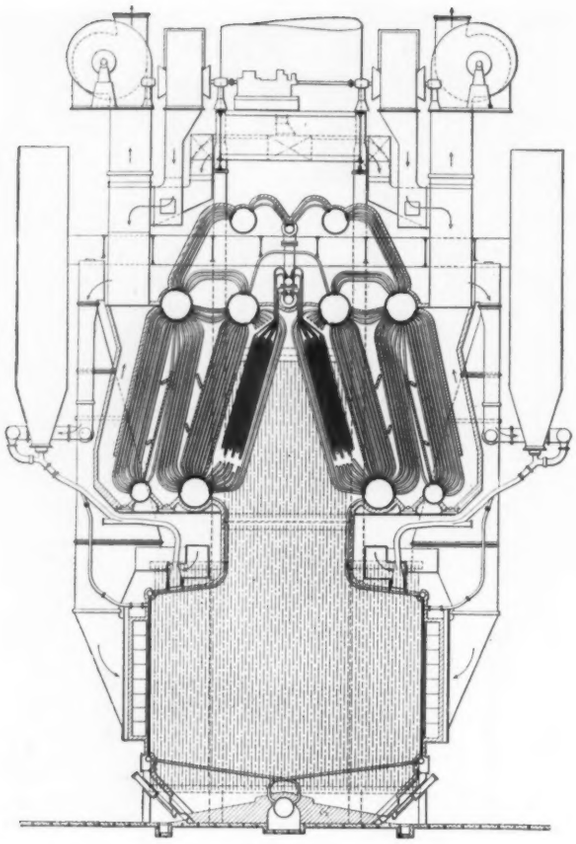
In this connection the past year or two has shown that it is both possible and economical to shut down complete stations or complete station units for even a few hours. Thus a power station or a power station unit is considered more nearly like a motor, to be started or stopped when needed, and former prohibitions on starting and stopping have proved unfounded.

Some equipment developments

Boiler sizes and boiler ratings have been increased greatly. Boilers are in operation with 60,000 sq.ft. of water-heating surface and a steam rating of 1,250,000 lb. per hour. A boiler of this type has a furnace volume of 38,000 cu.ft., 38,000 sq.ft. of air preheating surface and a superheater of 3,900 sq.ft.

Common practice has come to mean water-cooled furnace walls with both radiant and convection types of superheaters. Deposits of ash or slag on boiler tubes have been overcome by rearrangements and redesigns of the first rows of tubes. Many new boilers using coal with low fusing ash have vertical firing and water-cooled refractory-lined furnace bottoms, so that the ash, which accumulates as liquid slag, is tapped off.

Both stokers and pulverized fuel firing continue to be used. One of the largest stokers burns 73 lb. of coal per square foot per hour on a stoker area of 694 sq.ft.



Rated to produce 1,250,000 lb. of steam per hour at 425 lb. pressure

East River Station of New York Edison Company

Heat release from pulverized fuel furnaces ranges up to 38,000 B.t.u. per cubic foot per hour. The unit system of pulverized fuel has gained in favor over the bin system and the coal is dried in the pulverizers with preheated air. Inside coal bunkers are being eliminated very largely in favor of coal silos and outside storage.

Air heaters are used with and without economizers for air temperatures of about 350 deg. F. for stokers and up to 650 deg. F. for pulverized fuel. Cleaning of flue gases is still a problem, with the cost of cleaning the dominant factor.

Boiler water is now deoxidized and generally distilled and motor-driven centrifugal feed pumps usually have steam-driven reserve units. Water circulation and water levels in drums caused troubles in recent stations, but these problems have been solved. Welded boiler drums are gaining in favor.

Generating units have increased in size and in voltage rating. In 60-cycle units 1,200, 1,800 and 3,600 r.p.m. designs are used. The largest 60-cycle, 1,800-r.p.m. turbine is rated 200,000 kva. at 80 per cent power factor and 16,000 volts. The limiting design is about 300,000 kva. and the limiting design in 3,600-r.p.m. units is about 70,000 kva. Several machines for 33,000 volts are designed or in operation. Turbines are bled at from one to five points for feedwater heating in the regenerative cycle. Condensers have been improved by rolling tubes into the tube sheets and by distributing the surface to better advantage. The single-pass condenser and the steam jet vacuum pump are favored.

Some erosion of the last rows of turbine blades has occurred due to moisture because of insufficient superheat in the expansion range and this has been partially solved by redesigning the blades. Reheating on 1,200-lb. stations is the usual practice.

All these improvements and developments make it possible to build an economical fuel-burning station under favorable conditions to give unit operating reliability of about 90 per cent, a first cost of around $75 a kilowatt and an operating performance of about 12,000 B.t.u. at about 50 per cent load factor. Fuel-generated energy at about 3 mills per kilowatt-hour total cost may be expected in many instances with the next group of stations constructed.

Hydro developments

Hydro-electric power is utilized on large systems under conditions to give maximum energy when water is plentiful and maximum efficiency on peak loads when water is scarce. The technical developments have largely been along lines to give more capacity in a given space and more efficiency over a wider range of load. Higher specific speeds and the Kaplan type of turbine are the two chief contributions of recent date in addition to better design of water passages.

Some recent new installations of Francis type turbine units are as follows: 90,700 hp. for 327-ft. head, 49,000 hp. for 800-ft. head, 57,000 hp. for 81-ft. head. At Safe Harbor 42,500-hp. Kaplan type turbines are used on a 53-ft. head.

It is apparent that the building of the next group of hydro and steam stations will bring about cost values in power production that will enable the industry to maintain its rate of progress in market expansion. In addition, experimental and research developments promise to bring about still newer developments that are apt to be commercial within a few years. New stations and the rebuilding of old stations are on the horizon for quick action when normal loads return to utility systems.

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Saskatchewan Diversion Practicable but Costly

Diversion of the course of the Saskatchewan River to provide a 400,000-hp. hydro development in northern Manitoba now appears more feasible than ever, D. G. McKenzie, Minister of Natural Resources for that province, told the Legislature recently. The Saskatchewan River, which drains a country 400 miles wide from the Rocky Mountains to Lake Winnipeg, will, if the plan is carried out, be diverted into Lakes Winnipegosis and Manitoba and thence, by a new channel, into Lake Winnipeg. Lake Winnipeg is 100 ft. lower than Lake Manitoba, and a power plant will be built at the new channel mouth on Sturgeon Bay, Lake Winnipeg, to carry the water to the edge of Lake Winnipeg, where it will be precipitated 80 ft. over the power dam to turn the turbines.

The scheme is merely in the project stage, but the Legislature voted $12,000 last winter to investigate its feasibility, and engineers have been over the route for several months. They put the cost at from $40,000,000 to $60,000,000, and this seems, at any rate for the present, an insurmountable obstacle to the carrying out of the scheme.

Distribution Advancing Rapidly

New equipment in transformers, arresters, breakers and substations. Networks make savings possible. Cost reduction dominant.

THERE had long been a feeling that it was futile to try to do anything toward standardizing distribution and cutting its cost, but that feeling has faded rapidly during the past year. The subject has recently been accorded the degree of attention and scrutiny that had previously given generation and transformation an overshadowing prominence and economy. Solicitous executives had been urging a critical study for four or five years. That plea has been heeded and distribution seems to be headed toward practices that will give it both the flexibility for growth and the reduced unit expenditures that a sure-to-grow industry demands. Not that this gives any assurance that distribution costs per customer are to be brought down to equality with other departments of the system. It does, however, presage a distinct check to the inordinate rise in dollars required per customer to get the energy to him after it has left the bulk channels. Dominant in the tendencies which this intensive study has established is the unit assembly idea.

Operating interest in distribution losses, voltage regulation, diversities, load densities and rates of growth has been whetted. Load counts, scanning of customer-billing records for demands and consumption and graphic-metering installations have all been engaged in to provide the data for study of energy distribution as to both time and space. The desire has been for more data about load curves and a more refined determination of load densities and how much they vary from point to point. Such studies have largely been prompted by the critical attitude toward the efficacy and economy of radial distribution as compared with some of the network schemes.

Electrical distribution grids copy water, gas

Out of these studies the manufacturer has been inspired to undertake his part of the cut-the-cost program, namely, to simplify, standardize and unify his product. He has extended the scope of a few designs over a range previously covered by a multiplicity of relatively uncorrelated elements. The growth of favor of the network has made most of this possible, but the radial system is benefiting by the same trend toward simplified practices.

Apparently not much can be done with the pole-and-wire components of distribution. Therefore the perfectly natural aim has been to cut costs and at the same time improve service reliability by substituting for the inflexibility of the radial scheme the grid virtues of the network, either primary or secondary, and in both underground and overhead areas. Water and gas have for years been distributed through meshes of interconnected pipes fed by a multiplicity of routes from even fewer sources than are commonly provided in the electrical system. Any radial scheme bent on reaching specific areas exclusively by mains that successively fork like the branches of a tree would have been discarded even in the pioneering days of those industries. That radial method has, however, been the universal practice in the electrical field ever since alternating current supplanted direct current. It has taken all these years for the alternating system to catch up with the water and gas concept. It is just now catching up with the grid scheme of the early Edison d.c. systems. The technical obstacles to cross-feeds and complete paralleling have been great, but they have recently been overcome at a lively rate.

As a result we have the tendency toward synchronizing at the load, the primary network and the secondary network, with the attendant benefits no longer confined to areas requiring underground construction. Synchronizing at the load eliminates a bus at the generating station and another at the substation; each generator feeds directly to many points of the system and each area of the system derives its supply from several different generators or generating stations. High-tension breakers are eliminated at the load points, the circuit interruption function being performed at the generator end of the cables.

Application of the network idea in the lower voltage levels has, however, been the more recent activity in the effort to emulate the simplicity of water and gas and the characteristic Edison d.c. system. The aim has been to improve service reliability, meet growth and shifts of load with a minimum of readjustment and a minimum of excess capacity, improve service quality and cut costs. Relatively large lumps of capacity have to be provided at one time when the loading approaches the limit of facilities on any tentacle of a radial system. There follow idle years for this excess capacity while the load grows to absorb it. Network capacities can grow by smaller increments, inasmuch as capacity at one point is automatically available to aid adjacent units in meeting the local demands upon them. One distinct phase of the economy program for distribution has thus been that of paring the amount of unworked capacities provided in radial systems in exactly the same way that transmission interconnections have permitted reductions in reserves of generation capacities at all points on the interconnected system.

Another significant aspect of the cost-reduction program has been the savings, immediate and potential, that reside in the opportunity afforded the manufacturer to reduce the number of ratings of transformers and of the accessory control and protective equipment. That, in turn, has promoted designs which integrate these standardized units into unit assemblies that make erection

far more a factory job than a field job. Those unit assemblies are in sharp contrast to the diversity and individuality of design that characterized the radial substations of the past. The new assemblies take the manufacture of electrical distribution facilities out of the exclusive custom-built province and put it into the category of quantity production of a standardized product. When sales again reach a creditable volume the electrical industry can expect to derive considerable benefit from the new trend. There will be lower costs for those important distribution elements that in the past have stymied the desire to bring down the investment per customer in the distribution system.

Radial, primary network and secondary network all appear to have their advocates and each an appropriate field of economic merit. The primary network at 4 kv. in areas where all circuits are overhead can save upward from $5 per kva. of distribution peak where densities exceed 3,000 kva. per square mile by comparison with the straight 4-kv. radial system, including its substations. It is at a disadvantage of the same amount, however, with respect to a 13.2-kv. radial system which eliminates the distribution substations for load densities of this magnitude. When, however, the secondary alone is open wire, all other circuits underground, the 4-kv. primary network is some $21 per kva. cheaper than the 4-kv. radial at 3,000 kva. per square mile. As compared with the 13.2-kv. radial it is about $20 more expensive at this load density. Pittsburgh reported a 40 per cent saving with primary network on a load density of 2,100 kva. per square mile.

The overhead secondary network has most recently appeared, founded directly on the mentioned trend toward unit assembly of standardized production units. This gives it potentiality to duplicate in medium-load-density areas the long-known benefits of the underground secondary network in areas where loads are more dense. The savings possible with the secondary network show even greater than the primary network under certain conditions. At 3,000 kva. per square mile it figures $17 per kva. cheaper than 4-kv. radial, $7 cheaper than the 13.2-kv. radial and $12 cheaper than the 4-kv. primary network. These savings grow as the load densities rise in areas where feeders, primaries and secondaries are all on poles. At the same 3,000-kva.-per-square-mile-load densities the secondary network overhead and all other circuits underground is cheaper than any other of the three alternatives except the 13.2-kv. radial. Even this disadvantage disappears where densities are as high as 4,500 kva. per square mile. Under these conditions the secondary network is $80 per kva. cheaper than the 4-kv. radial, $26 cheaper than the 13.2-kv. radial and $63 cheaper than the primary network.

Any utility is missing a bet if it does not investigate the primary network for densities up to 1,500 or 2,500 kva. per square mile in areas where the circuits may be either all overhead or partly underground. Likewise the secondary network should be looked into for all areas having densities above 2,500 or 3,500 kva. per square mile, depending on whether circuits are wholly overhead or partly underground. That these savings are distinctly worth making is evident when it is noted that they run well into six figures of investment per square mile of distribution.

Some companies have experienced a pronounced reduction in the burden on the engineering departments subsequent to the adoption of either of the network schemes. Hectic is perhaps a strong word to apply to the atmosphere in the engineering department when inquiries from the service application bureau call for reports on proper service lateral locations and available capacities of transformers, primaries and secondaries to meet prospective loads. A personal knowledge of existing loads on given radials has almost been necessary to make the requisite answer possible. But with the network scheme this burden on the engineering department is greatly simplified; there is little worry about the local adequacy of the enlarged network conductors and the lateral taps are easily effected. Existing customers are less disturbed when connections are made to new ones. These are cited as some of the indirect, but nevertheless tangible, benefits that have accrued from the reduction of distribution toward a more standardized technique in both layout and equipment details.

Protection equipment improved

Transmission and station outages from lightning causes have been steadily reduced by advances in relaying, apparatus and insulation design and by better arrester technique. But outages resulting from lightning effects on distribution circuits still remain as a productive source of real public relations detriments. Only recently has the distribution transformer been made available with built-in protection against lightning. In one design "Thyrite" arresters are placed inside the tank and shunt the major insulation of the high- and low-voltage windings. Lightning surges are thus restricted to a fraction of the impulse strength of the transformer insulation. Power current follow-on is limited to a half cycle and to such magnitude as to leave fusing practice unchanged. In another design Deion surge protective gaps are placed inside the tank and so connected as to limit the voltage stress that can exist between these windings and the core and case. These innovations should reduce greatly the risk of more or less prolonged outages on distribution circuits and thus avoid lost revenues and heavy expenditures for repair and replacement. Incidentally, when outages from any cause are of appreciable duration the simultaneous starting of many refrigerator and oil-burner motors makes for proneness to transformer fuse blowouts and these start a new chain of troubles. Advocates of the network cite this as another not wholly minor factor in its favor, even where its cost may be slightly higher than a radial installation. Thus both the lightning-proof transformer and the network contribute to service continuity.

Using a single conductor as a common neutral for both primary and secondary circuits is not a new practice. Nevertheless it has not been broadly applied pending a verification of its virtues as to economy, inductive coordination and safety. After an extended and thorough joint study in California the scheme has been given approval by the Railroad Commission, contingent upon a set of practices which will assure minimum interaction of economy and service factors in both power and telephone fields. Elimination of one wire out of seven or out of five cannot be expected to reflect phenomenal savings in distribution costs, but the unfavorable reputation of distribution justifies grasping every opportunity to conserve even a small part of the outlay.

As another phase affecting the conductor portion of the system it may be noted that the resort to cabled wires

for primary and secondary leads is helping to meet the tree problem. For the subsurface job parkway type cable is being used to an increasing extent, in some cases under the sidewalk with a plank above it for protection against invasion by the pickax. In the duct type of installation the creosote wood duct has been developed to find its place alongside fiber and clay construction, long used in underground work.

Street lighting has made further strides in breaking away from its series fetters. Converting street lights to parallel operation is a matter of imitating the evolution of general lighting circuits which began their parallel career with Edison's system. The problem is one of getting the circuits on and off according to schedule without interfering with the continuous functioning of the general distribution circuits from which they are to be served. Carrier current has been used successfully to actuate the relays which close and open the street-lighting circuits. In other instances a cascade arrangement has proved effective; one circuit close to a substation is closed manually or automatically and a series relay inserted in it closes a contiguous circuit, and so on. The photocell is also unfolding its possibilities toward making this street-lighting circuit control function more and more an automatic one not only for highway lighting but also for display illumination.

About the rural line problem little can be said except that claims of construction at $500 per mile or even less are announced alongside equally authentic cost analyses that present investment figures of $2,000 or even more per mile. Standards and conditions admittedly differ widely, but there must be some common denominator to which all these divergent cost figures can be reduced. Maybe if that common base could be established there would be more progress toward segregating and attacking individually the obstacles to lower and more uniform rural line costs. There rests a task for the rural electrification groups fully as productive of results as the program of showing the farmer the manifold potentialities of electricity.

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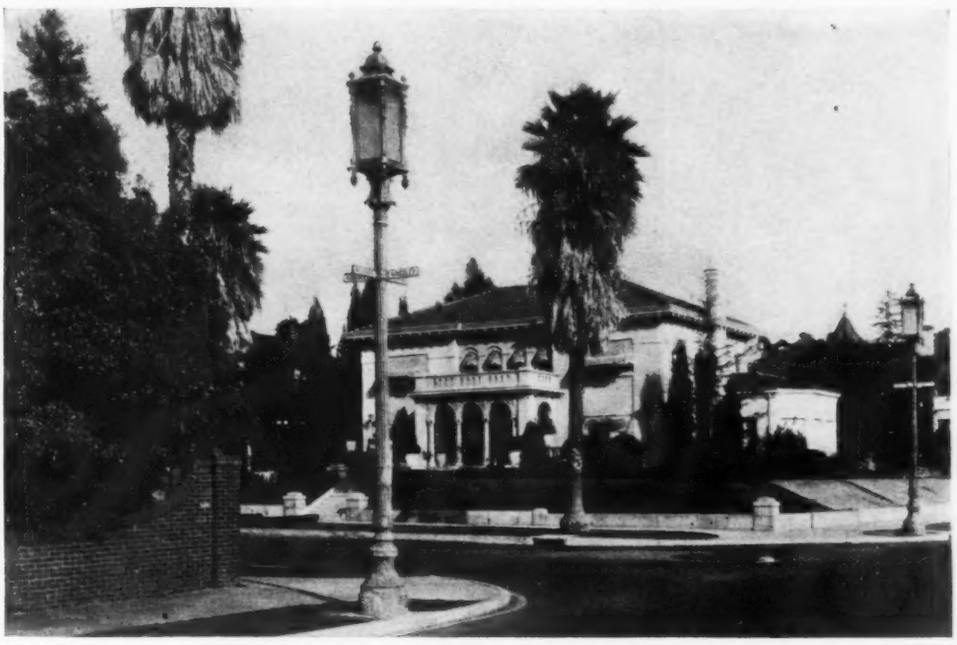
Distinctive Lighting Stimulates Progress

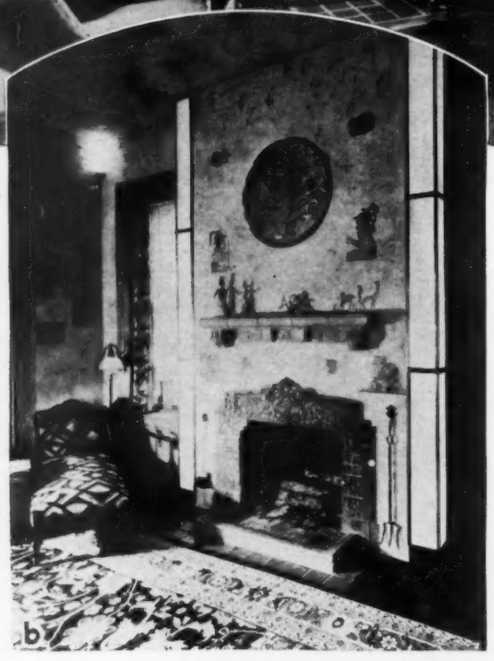


LIGHTING of distinction has become a major objective of discriminating homekeepers, architects, merchants and public officials concerned in the purchase of illumination. An amazing development in equipment spans the gap between the unshaded lamps of pioneer days and the artistic sources of diffused light now available for every appropriate class of service. While remaining a progressive science, lighting has become a noble art. Future possibilities under the stimulation of good taste, originality and engineering cooperation appear almost limitless.

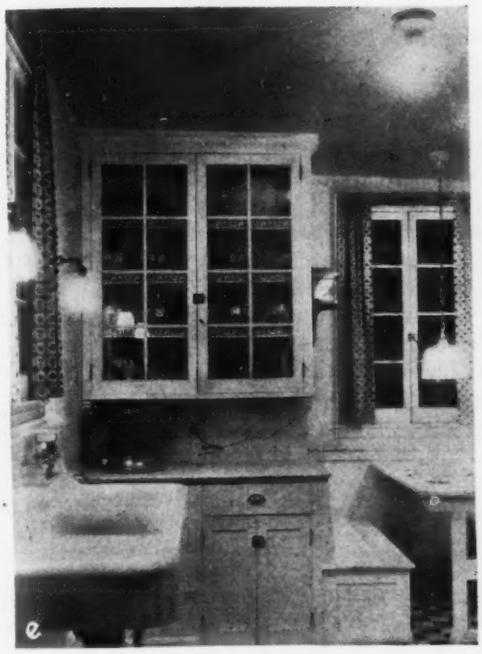
Every field of lighting reveals modernized conceptions of its importance in smoothing the human pathway. The efficiency of modern electric lamps makes economically feasible many departures from former practice. Glare is taboo. Ugly and unattractive fixture designs are passing into the discard. The requirements of utility are as important as ever, but art and science are combining their talents and energies as never before.

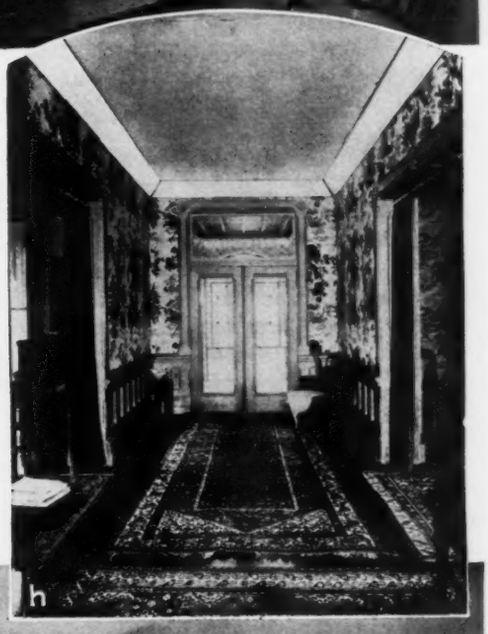
In attempting even a brief survey of recent lighting progress in three typical fields, residential, commercial and street illumination, the wealth of material available baffles selection. Complete coverage is impossible, and the examples presented cannot fairly be considered as exclusive in superiority over many others which comprehensive treatment would add if space permitted.

Decorative and Convenient Home Lighting



(a) Portable units serve Brookline living room with flexibility and charm, (b and h) Built-in lighting in a Springfield, Mass., study and hallway. Dimmer control and color effects are provided. (c) "Plate lighting" design fits modernistic living room scheme. (d) Simple equipment meets needs of semi-modernistic study.





(e) General, localized and decorative lighting serve kitchen and breakfast nook. (f) New England colonial dining room beautified by simple period fixtures. (g) Cove lighting of a small dining room appeals to some owners. (i) Unobtrusive lighting gives restful effects in chamber.

Throughout this summary, however, the reader will note the emergence of certain trends which not only mark progress to higher planes of design and application but also hint at the nearness of some important commercial possibilities as popular acceptance of the best ideas is translated into willingness to pay for them.

Beauty and usefulness dominate home-lighting trend

Conventional forms of home lighting are still holding their own against such newer applications as built-in illumination, cove lighting or the use of color schemes as proposed substitutes for redecoration. They do this partly through the variations of taste which can always be counted upon to provide a market for well-tried layouts and partly on economic grounds. The field of the portable lamp and of the fixed unit in home service seems impregnable so long as good engineering controls their design, manufacture and application. As built-in equipment becomes more widely used, however, it will compete more and more actively with more familiar applications, and such striking examples of success in commercial fields as are shown later in this article are already having their influence upon residential installations. Forward-looking architects are keenly interested in these modernistic motifs and are coming into closer accord with the illuminating engineers in harmonizing plans.

Taking up specific examples, a somewhat conventional Brookline, Mass., living room uses direct-semi-indirect portable, wall bracket and bridge lamp equipment, but it is an installation filled with pleasing contrasts, sometimes lacking in more modernistic applications. Maximum flexibility is provided through ample outlets and rearrangements of furnishings and of lighting can be made with ease and certainty of satisfaction. Parchment shades keep out glare and the combination of 260-watt and 300-watt lamps for direct and indirect distribution gives admirable results. Silhouette lighting is provided in this room by a 15-watt unit when the occupants are absent. In a modernistic living room equipped with panel lighting, the units are 25-watt tubular lamps mounted behind imported, pink-tinted, pressed glass built flush into the walls.

A modified modernistic study is effectively lighted by a 200-watt "Duplexalite" at the ceiling and a 60-watt table unit. The room is only 10x12x10 ft. in dimensions, but appears considerably larger because of its furnishings. Two applications of built-in lighting are made in a study and hallway of a Springfield, Mass., residence. The feature of the former is an installation of amber, blue and red lamps mounted behind opal glass pilasters on either side of the fireplace and controlled by dimmers. It has been stated that cost of installation was not a primary consideration in this case, but as pioneering of this kind becomes conventional the differential over usual methods will of course diminish. The hallway units are 25-watt lamps mounted on 12-in. centers behind the panels. Architectural opinion is not lacking that built-in lighting increases the salability of residences, but adequate lamp ratings must be supplied.

Dining room lighting covers an immense field. A typical period fixture of pewter with frosted chimneys serves a 12x12x7½-ft. room, only five 25-watt tubular frosted lamps being required. Two three-way switches control the fixture and give flexible service. Another dining room illustrates the use of cove lighting by 10-watt lamps mounted on 8-in. centers above the molding. Kitchen lighting has been pretty well standardized in recent years through the application of ceiling fixtures of porcelain to inclose single lamps of from 75 to 150 watts rating, using bracket lamps for localized lighting over working areas as required. Breakfast nooks use drop or ceiling units, and a recent decorative application of illuminated ornaments suggests possibilities of interest in such locations.

The lighting of bedchambers varies greatly in detail, but the current trend favors the use of a general source supplemented by bracket or portable lamps for dresser service, reading and other local applications. In a representative installation the room being 12x10x10 ft., with an overhead unit of two 60-watt lamps, two 60-watt long standard vanity lamps and a sun lamp near the bed. The use of built-in lighting may be expected to make rapid headway in bathrooms in view of the value of flush type equipment and the appeal of style changes.

Commercial equipment meets challenge of variety

In the commercial lighting field the variety of applications illustrating progressive trends is literally enormous. Display lighting is making great strides. Industrial lighting, while largely utilitarian, tends to overlap commercial illumination in some fields, such as the newspaper composing room. Window, showcase, sign and billboard lighting are making excellent headway; the paneling of buildings for built-in exterior illumination is coming to the front, and a new art is being developed in connection with the lighting of recreation fields.

According to a recent address by A. L. Paulus of the Westinghouse Lamp Company an average electric sign yields a revenue equal to three ranges or four electric refrigerators or 21 irons or 70 vacuum cleaners. Only one-third of all business establishments have electric signs despite the fact that 500,000 are now in use in this country. Annually there are 120,000 new signs or replacements required. The average electric sign costs $400, burns six hours per day and consumes 1 kw. Proper maintenance would increase the annual revenue to central stations $20 per sign. The present annual revenue per capital from electrical advertising is $0.32, against a potential annual revenue of $1.50. Only 15 per cent of the 400,000 poster panels in the United States are artificially lighted. Such figures give but a hint of the market awaiting cultivation in the electrical display field, window lighting alone offering remarkable opportunities for the use of intensive daytime applications in order to offset external reflection.

From the Nela Park engineering department of the General Electric Company data are in hand regarding the lighting of the Kroger grocery store at Cleveland. Here a modern front of polished metal and glass is effectively advertised by a built-in sign carrying out the architectural motif. Bold letters projecting from the background of the sign are lighted from below by 45 100-watt lamps on 12-in. centers. A smaller sign over the doorway is silhouetted against a luminous glass face, and the windows are used for daylight displays with effective results. The interior of this store exhibits remarkable absence of glare despite the amount of glassware and variety of lighting equipment employed. The store dimensions are 44x96x16 ft., seventeen 750-watt Miller indirect units providing the general lighting. On the columns 80 25-watt lamps on 12-in. centers are used,

with 236 60-watt lamps on the same spacing on cornices. Showcases have 25-watt lamps on 18-in. centers.

Many unique lighting arrangements feature Bullock's Wilshire store in Los Angeles. Here the decorative luminous treatment and architectural layouts were planned together and every corner of this department store is of interest to the illuminating engineer. A comprehensive discussion of this and other significant department store lighting was presented in the April, 1932, *Transactions of the Illuminating Engineering Society* by J. L. Stair, chief engineer Curtis Lighting, Inc., Chicago. The objective has been attained of subordinating the lighting to the merchandise displays without losing the maximum individualized decorative effects of the former. In a typical section devoted to the sale of toilet accessories pairs of flat rectangular boxes bound in metal are located between ceiling beams. Above each are four 150-watt lamps in silvered reflectors. Rising vertically to the ceiling from the tops of the wall display cases and built into the marble wall surface are wide bands of diffusing glass. These traverse the ceiling for a few feet only and then end abruptly. Overlaid metal mullions divide each band into five vertical strips. The recess in the wall behind the glass is sufficiently large to permit the use of 150-watt lamps on 24-in. centers. A cross-fire of directed light beams insures an even brightness distribution on the glass.

Striking exterior display effects are obtained at the office building of the Niagara-Hudson company at Niagara Falls, N. Y., by the use of recessed luminous pilasters behind which are mounted 40-watt lamps with red color caps, 75-watt natural blue glass lamps, 15-watt lamps with green color equipment and 15-watt plain lamps. Each color recurs at every foot. Flashed opal glass set in metal frames is used for the front, and dimmer control is provided. The total connected load on the pilasters is 72 kw. The parapet is color floodlighted. This type of illumination opens the door to a development likely to lead to uses of energy and equipment on an unprecedented scale in the future.

In concluding these brief references to commercial lighting progress mention should be made of advances in theater auditorium and lobby illumination. Here architecture and illumination go hand in hand and the modernistic trend is evident and essential. The new Paramount Theater in Boston typifies this movement. More than 9,800 lamps are used on the exterior of this house, which seats about 2,000 persons. In the main auditorium the walls are treated in aluminum paint and gold leaf, with damask panels in harmonizing color tones. Panels of light feature the general design. The pilasters are topped by fluted glass leaves tinted in amber.

The market for outdoor recreational lighting in this country is growing by leaps. F. D. Crowther of the General Electric Company states that playground baseball, or kitten ball, as it is sometimes called, is taking the country by storm. In seven Wisconsin towns about 1,000 teams are regularly playing, and in the South and on the Pacific Coast interest is even greater. In southern California there is a night baseball association with lighted fields in sixteen cities where scheduled games are played by amateurs. As the participants are working people, who must find their recreation in the evening, this opens a vast field for lighting service. C. A. B. Halvorson recently told the lighting section of the New England Division, N.E.L.A., that this class of service offers a load-building opportunity of great importance; that it is making headway through the co-operation of such organizations as the National Recreation Association, the manufacturers, central stations and municipal authorities, and that participation in outdoor sports under proper lighting conditions during the evening hours tends to reduce crime and misdemeanors.

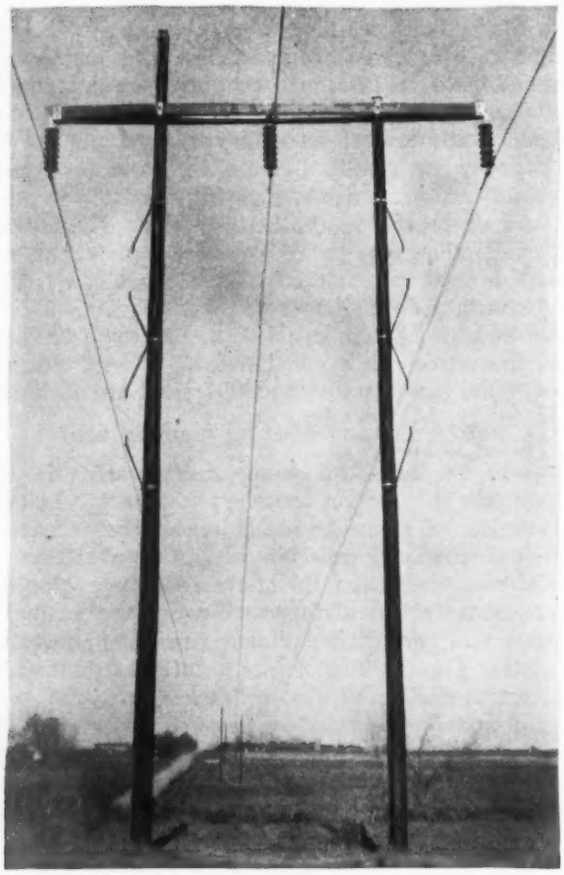
The cost of equipping a high-grade playground baseball diamond for night lighting, expressed in terms of list prices, is only $1,762. This includes twelve floodlighting projectors with 1,000-watt lamps, $721; six 40-ft. poles, $201; four safety switches, $85; labor, $250; a 15-kva. transformer, $133; wiring materials and overhead. An installation with four open floodlights of 1,500 watts rating can be made for not over $956 list. Tennis, quoits, football and many other sports are being illuminated along standard layout lines, and the extension of central-station service to such fields is likely to become a matter of routine in the near future. The estimated cost of floodlighting tennis courts per court on a list basis is as follows: One court, $948; two courts, $481; three courts, $334; four courts, $370 each, to which should be added $133 for a 15-kva. primary transformer in the first three cases and $194 for a 25-kva. unit in the fourth. Primary installation and freight are excluded.

Street lighting entering highway field

One of the most important developments in street lighting now in progress is its application to trunk highway service. A pioneer installation in Massachusetts on a 40-ft. highway approaching Lynn from Revere has been in use several months and marks the beginning of a movement for standardization under the auspices of the state and for participation by the commonwealth in the costs. The last Legislature authorized the state Department of Public Works to "demonstrate the expediency of installing similar systems on other state highways." More than 13,000 vehicles per day pass over the 12,473-ft. section forming the unit, and at least double this number on Sundays. This four-lane road has a bituminous macadam surface. The lighting equipment consists of 4,000-lumen lamps mounted alternately on 8- and 12-ft. brackets, with staggered spacing 250 ft. apart, the height above the roadway being 25 ft. The General Electric Company supplied the installation and the refractors (new "Holophane" H-R highway type) direct nearly all the light along the road longitudinally, little being lost in the adjoining marshes. The high mounting height practically eliminates glare. The reflection factor is only about 4 per cent, but even under this handicap the results are excellent, and with a light concrete surface would be just about all that could be desired by the most captious critic. The cost of lighting this installation is $1,325 per mile per year (at $65 per lamp), and the state shares half the expense with the municipalities traversed. The installation cost about $8,000 for the 2.3-mile section. Safety of travel has been greatly enhanced by this notable example of co-operation.

In urban lighting the trend is strongly toward mounting lamps well out over the roadway to illuminate the street surface as evenly as feasible, despite the handicaps of thick foliage. Even where no foliage obstructs vision outboard suspension and closer spacings are being utilized to great advantage. Advances in artistic design of street-lighting fixtures have brought this equipment into the finest residential neighborhoods.

Transmission Practices Adopted for Minimum Investment High Reliability Low Maintenance Future Needs



Low-cost 110-kv. line using eight structures per mile

50- and 55-ft. creosoted pine poles on 13-ft. centers using seven No. 25622 O.B. insulators, two 3x10-in. x 26-ft. fir arms and double gaps in down leads on poles (Company U)

WHAT major design features are being incorporated in transmission lines and closely associated equipment to minimize the unit investment, secure greater reliability without disproportionate expense, reduce necessity of maintenance or adapt lines to future requirements? This was a question asked of leading transmission companies in various parts of the United States, comments from which are condensed in this résumé. Two facts stand out in the replies: (1) Lower unit costs are usually obtained with a sacrifice in reliability, maintenance expense and adaptability to future needs; (2) the best compromise is obtained by balanced design and not by concentrating on any single factor.

A variety of approaches to the best combination of results is reported, influenced to a large extent by the previous practices followed by the respective companies and of course by the service requirements of the lines involved. While at least five companies emphasize the contribution which high-speed circuit breakers and the newer types of relays have made to reliability and stability of transmission service, one theme seems to predominate more than any other throughout the comments. This is that wood-pole transmission lines are being designed to make greater utilization of the insulation of wood. Closely allied with this is the predominating attention given to wood-pole structures, although this may be due to the fact that fewer major transmission lines requiring steel structures have been built recently by the companies reporting. Use and position of ground wires also command a fair amount of attention.

Provision of clearances which will allow for raising the voltage of lines by merely changing insulators is mentioned by several as the means for adapting lines to future needs. Arrangements for reducing the number of oil circuit breakers, use of deïonizing relief gaps, arcing rings and fused grading shields, overinsulation of lines, longer spans, double-circuit vs. single-circuit structures, horizontal vs. vertical spacing and use of capacitors to increase the carrying capacity of lines figure among the practices adopted. Grading insulation at line terminals and use of ground-wire shields are methods used to reduce the cost of terminal equipment and improve reliability. While not mentioned by so many companies, reports were also given on the use of shielded transformers, hinged wooden crossarms, semi-flexible towers, load-ratio control, repeater fuses, X-braced H-frames, automatic pole-top switches, aluminum wire with vibration dampers and line-type lightning arresters.

Since some of the recent practices of the companies reporting cannot be discussed separately from the related practices it seems advisable to brief the reports by company rather than discuss the practices under different classifications. The companies are designated by letters and grouped by region.

New England

Company A — All recent major high-voltage lines (110–220 kv. inclusive) involve single-circuit, semi-flexible, steel towers with horizontally arranged conductors and two overhead ground wires per circuit. This construction gives low average height above ground and employs low stringing tensions. Grading rings are used on all high-voltage insulator strings. No lower cost is involved, but there is a material gain in reliability.

To Care for Reasonable Future Needs

(a) Make a sensible plan of development to care for probable growth and developments.

(b) Provide real estate and right-of-way for the imagined limit.

(c) Provide steel and equipment for what seems certain in five or six years.

(d) Avoid investment in structures which may be out of date before they start to earn return.

(e) Remember that the 8 to 15 per cent fixed charges will double the cost of idle investment in twelve to seven years respectively.

(Policy of Co. I)

High-speed, balanced current and impedance relays are used on nearly all high-voltage lines, and the breakers used are expected to clear faults in 8 cycles. Reduction of system disturbances has been remarkable. The newer relays and high-speed breakers have jointly contributed the biggest advancement in transmission reliability.

Shielded type 220-kv. transformers are used, with the expectation that they will increase the immunity to lightning. A saving in breakers has been effected by an arrangement involving 1½ breakers per circuit.

To Keep Down Investment

(a) Build a good, sturdy connection and depend upon it to do the job. A single-circuit line of better design and more generous spacing may often give equal or better service than a double-circuit line skimped in spacing, insulation and design—and at less cost.

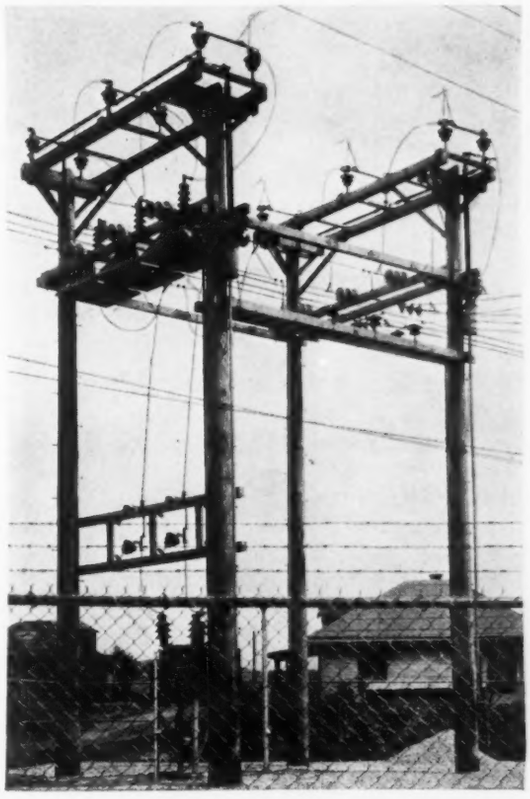
(b) Design skillfully. Eliminate eccentricities in steel details. Utilize an anchor design which takes account of excavating facilities and costs which are probable on the particular line under consideration. A deep grillage anchor may be economical in situations favorable to excavation by an earth augur, but a shallow, pyramidal type may save much money in rough, hilly country.

(c) Design consistently. Do not add factors of safety upon other factors of safety. Decide what maximum conditions must be met and design to just meet them in every part. It is still well to emulate the famous "deacon's one-hoss shay."

(Policy of Co. I)

To reduce the number of flashovers pole grounds have been detached from crossarm hardware and dropped 5 to 6 ft. below their level, at which point the overhead ground wires are attached. Where possible guys are attached at the same elevation, otherwise 6-ft. wood strains are inserted in the guys. More complete utilization of wood insulation is possible.

Company B—For greater reliability, graded terminal insulation, additional ground wires adjacent to substations to serve as shields, arcing horns or rings, reduced height of conductors above ground, separate circuits on separate towers, improved relay protection (including high-speed relays and breakers when necessary), and reduced tower footing resistance have been adopted.



Trouble on either line entering this tap station automatically isolates faulty line (Company F)

Maintenance expense has been reduced by using surge indicators, visible from the ground, to indicate flashovers to ground without climbing towers.

Middle Atlantic

Company C — More effective positions of ground wires, better grounding of tower footings and buried counterpoise wires offer promising possibilities. High-speed breakers have greatly improved stability and reliability, expedited clearing of faulty lines and reduced arc damage to conductors and insulators.

Company D—26-kv. wood-pole construction has been designed for 1,000-kv. impulse insulation and equipped with relief gaps every fourth pole. No ground wires are used, but this design is expected to be practically immune from lightning.

On all 132- and 220-kv. steel towers use is made of arcing rings and ground wires with auxiliary earth wires

To Insure High Reliability

(a) Anticipate the unusual which may probably (not possibly) occur. Be sure that faults of design, particularly of switches or mechanisms generally, are eliminated. Test new designs or applications of old equipment under conditions approximating those to be met in service.

(b) Be liberal in insulation and clearances.

(c) Keep tower heights reasonably low.

(d) Install one or two ground wires with adequate strength and clearance.

(e) Offset conductors as much as seems economically feasible.

(f) Clear right-of-way of trees which threaten to interfere with the line.

(Policy of Co. I)

to reduce footing resistance. The arcing rings are used to reduce arc damage to insulators.

Insulation at substations is co-ordinated to limit impulse voltages, using either relief gaps or lightning arresters (only on 26 kv.) and requiring higher insulation on the buses, bushings and transformer windings than on the preceding apparatus. Phasing buses and potheads at the terminals of 26-kv. lines are reducing the time for rephasing and grounding.

Company E—By utilizing natural insulation of wood crossarms and poles it has been possible to operate two 66-kv. lines satisfactorily with only three disks in suspension and four in strain. Capacitors have increased the load capacity of 13.2-kv. lines without going to higher voltages. Unit type substations have decreased the cost of serving rural areas from the lower voltage transmission lines.

Attempts to reduce failures of oil breaker and transformer bushings and pin insulators will be made by periodic use of high-reading "meggers" and insulator test sticks. Plans are made to melt sleet on conductors by circulating currents, but the problem of handling sleet on ground wires has not been solved.

To adapt lines to future requirements 66-kv. steel tower lines are built with 110-kv. clearances and single-circuit wood-pole lines are constructed with sufficiently tall poles to allow the addition of a second circuit. Rights-of-way are provided for an extra line if there is strong probability of its future need.

Company F—Aluminum conductors and extra insulation are used on the latest 132-kv. lines. Deïon contacts are used on old as well as new circuit breakers. High-speed reclosing breakers are extensively used, but repeater fuses are needed for small transformer banks and branch lines of 25 kv. or less.

Existing relays have been modified with an instantaneous trip attachment to secure higher speeds. Directional relays have been changed to the directional control type (overcurrent element controlled by directional element). Percentage differential relays are preferred to the current-balance overcurrent type for differential protection. Where generators, generator bus and transformer bank are installed as a unit the differential protection of the generator has been supplemented by a ground relay in this circuit, the differential protection of the transformers has been discontinued and over-all differential protection provided from the neutral side of the generator to the 132-kv. side of the transformer breaker with a ground relay in this circuit.

Southeast

Company G—Wood H-frames possess economic advantages over steel for 110 kv. in the South when the topography is suitable, because of the availability of poles at low cost, no severe ice or wind loadings and low load density, permitting lighter conductors. Higher poles and longer spans are being used to reduce the investment. While some steel towers are used there is no trend away from wood H-frames.

Arcing horns or rings are used on some important lines with high short-circuit currents to protect the insulators from arc damage and avoid prolonged outages. They reduce the expense of emergency maintenance, which is always costly. While experience indicates that they increase the number of flashovers, the result is not objectionable because the damage to insulators is less.

Fused grading shields are used on a few towers at the ends of lines having higher insulation than the terminal equipment to protect the latter from incoming surges. An expulsion fuse extinguishes the arc.

The insulation of wood is used to a limited extent to increase reliability, but the conventional insulation is not cut down. For example, crossarm hardware is not bonded to the pole ground and gaps are used between the hardware and down lead as well as in the latter to

To Minimize Maintenance

(a) Provide helps for patrolmen, such as fence stiles, cable-crossing facilities over streams, occasional small supply houses with telephone and emergency repair materials.

(b) Design for conductor tensions of the lower order rather than the higher, when balancing the various economic factors of design.

(c) Design steel members located near the ground to have sufficient stiffness to care for cattle rubbing against them and bending them out of shape, and for the weight of repair men climbing to reach the ladder.

(d) Use bolts and nuts having snug threads, or provide adequate means to prevent loosening.

(e) Protect conductor with tape or armor of some description to prevent burning of strands near tower.

(Policy of Co. I)

prevent splitting of the wood. Where insulation on existing steel structures is inadequate and clearances would not permit adding insulator disks the steel crossarms are replaced with wood to increase insulation.

Suspension insulators are used on the newer 44-kv. lines to increase reliability, reduce maintenance, permit longer spans, facilitate sectionalizing and reduce radio interference. Because of the longer spans and sectionalizing advantage there is practically no increase in line investment over pin-type construction.

Many 110-kv. lines are spaced for 154-kv. operation and 154-kv. insulation is used on the strain structures, so a change to the higher voltage can easily be made when needed. When the change is quite imminent the entire line is insulated for the higher voltage, except near the terminals, where reduced insulation is used to protect the station equipment from incoming surges.

Omission of ground wires is being seriously considered on lines supplying secondary power or reserve capacity to load centers to minimize cost, although reliability is sacrificed. Such omission is not considered on lines of primary importance such as those constituting the only feed to important load centers.

Company H — On newer wood-pole H-frames two ground wires and insulators in all guys are being used. This construction is more expensive than H-frames without these features, but it shows improved performance over both steel and the old H-frames and seems to be justified.

Middle West

Company I—See policies in accompanying panels.

Company J—Wood braces are used on 24-kv. lines to remove a metal path between phases that flashovers might follow and avoid initiation of flashover by the electrostatic capacity of steel braces. For similar reasons line-type lightning arresters are installed at or near every 24-kv. pole-top switch to improve continuity of service, not to protect the switches.

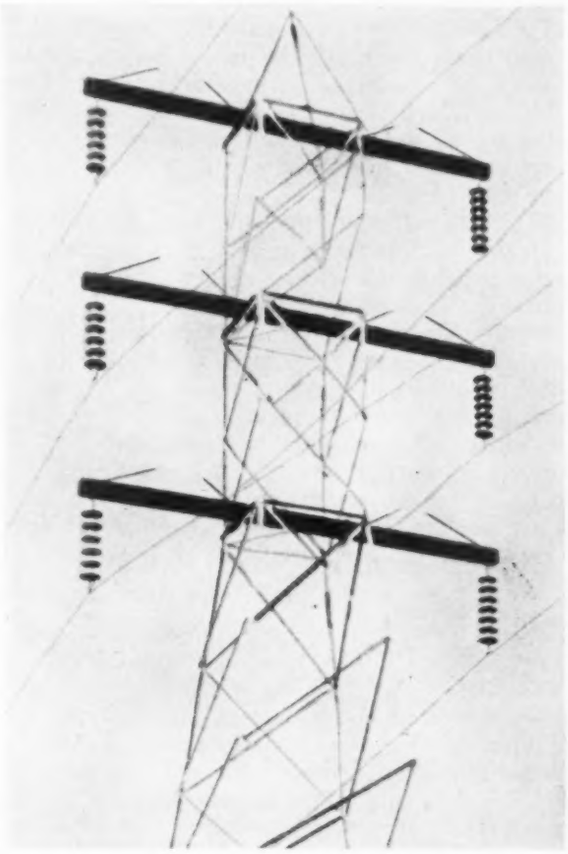
Some 300-ft. spans involving three circuits per lead are being planned where applicable. They will probably involve one 24-kv., one 4,800-volt and a street lighting or telephone circuit.

To isolate faulty sections of line and enable prompt restoration of service to stations fed by a tap between two switching stations an electrically operated pole-top switch has been designed. It will open and reclose on loss and restoration of voltage and is adaptable to remote control. One such switch is used on each side of tap and arranged so the tap station will be automatically reconnected to the end of the line not in trouble upon reclosure of the breaker. This equipment should greatly improve reliability of service without the expense of oil breaker stations.

Company K—Hinged wooden crossarms are used on 125 miles of 132-kv. steel tower line to secure the insulating value of the wood and reduce the cost of the towers by relieving them of the stresses imposed when conductors break. The towers cost 15 to 20 per cent less than rigid arm towers for the same conditions and the insulation provided by eleven disks is equivalent to 17-23 disks on steel arms. Two hundred and seventy-five miles of H-frame construction with two ground wires was recently constructed.

Company L—Steel arms and braces have been eliminated on 33-kv. wood poles by mounting wood crossarms on saddles. Wood strains with arcing horns are used in all guys.

Company M — Three conflicting requirements are encountered in line design: (1) Minimum cost; (2) protection against sleet; (3) provision for future demands. A compromise is made on 33- and 38-kv. main transmission lines by using H-frames with tall enough poles and ample conductor spacings so the voltage can be raised to 66 kv. Single-circuit construction involves 440-ft. spans, storm guyed every half mile. Transposition and storm-guy structures are combined, using wood crossarm braces, but a grounding wire is used on each pole because of severe lightning.



Substitution of wood crossarms for steel raised insulation of this 110-kv. line

Disks could not be added because of limited clearances (Company G)

This construction costs 10 per cent more than 33-kv. pin-type single-pole line spaced for the same factor of safety. The wood crossarm braces increase the strength of the simple unbraced structure 33⅓ per cent for sleet loads. Maintenance expense is practically negligible. These factors, plus the ability to raise voltage merely by adding insulators, make the construction more economical than any other considered.

Company N—To reduce maintenance, use is made of only the best materials, including guaranteed penetration poles and tested galvanized hardware. Steel-reinforced aluminum conductors are used with vibration dampers. Mechanical pole-hole digging, setting and tamping are employed; the latter avoids the necessity of going over lines to realign and retamp them.

Company O—Wood crossarm braces have been substituted for steel and wood strains are used in guys.

X-braced H-frames have more than double the transverse strength of unbraced structures, even when considerably lighter poles are used. A-frames are used where it is impossible to secure guying privileges for corners and angles.

Southwest

Company P—Carefully selected oil-treated poles decrease the number of interruptions, increase the life of poles and reduce maintenance.

Major 66-kv. lines are constructed for 110-kv. clearances so the voltage may be raised by merely adding insulators. Four and 2.3-kv. oil-field lines are designed for 13- or 22-kv. clearances. The additional first cost is offset by the use of standard equipment for all lower voltage lines and by the ease with which increases in voltage may be made.

Unit bays and standard equipment for substations make it possible to enlarge them at small expense, permit interchangeability of parts, reduce obsolescence and minimize the stock of spare parts.

Company Q—No crossarm braces are used on H-frames. Storm-guyed structures are eliminated where possible. Insulation of wood crossarms is utilized to protect against impulse voltages. Separation between static wires and conductors has been increased to get maximum lightning protection, and great care is exercised to secure minimum ground resistance. Spillway gaps are used on station equipment, wherever possible, in view of the increased insulation on lines.

Pacific and Rocky Mountain

Company R—No oil breakers are used on the outgoing ends of the latest 110-kv. lines, each line being switched on the 13.8-kv. side of its respective transformers.

Impedance relays and high-speed breakers with a minimum opening time of 11 cycles insure stability with minimum transmission investment.

Wood H-frames are used because they are less costly than steel and for their insulating value. Poles are treated at the butts and gains; crossarms all over. Creosote is used, although arsenic paste is substituted in some cases for the butts. Selected fir, 9 ft. long, creosoted and equipped with galvanized arcing horns, is used for strain insulators and guys. No ground wire is used on the latest lines, which are star-connected with solidly grounded neutral.

Special hardware has been developed for attachment of crossarms and insulators and for spacing double arms to reduce labor and radio interference.

Company S—Where light loading prevails two-circuit steel towers are used for 110 to 220-kv. inclusive. No difficulty is experienced working on one circuit while the other is alive. For single-circuit 60-kv. lines wood poles are used because of low cost and to facilitate attachment of distribution or telephone circuits. But steel poles are preferred for two-circuit lines to avoid the expense of renewing poles with one line in service.

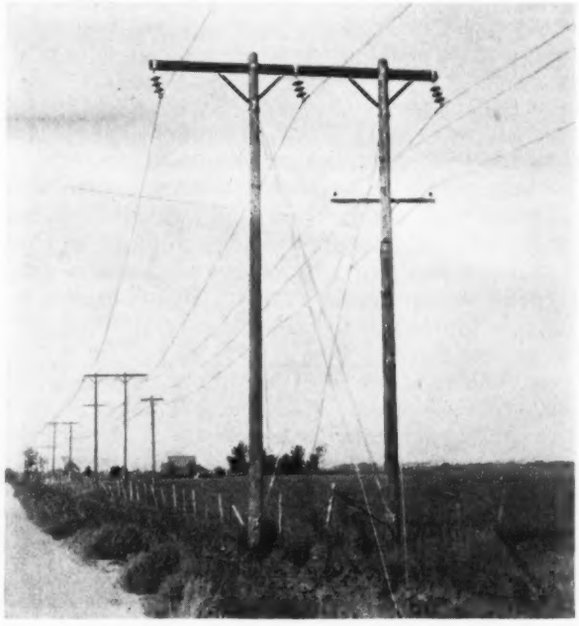
By using only one oil breaker per circuit with main and auxiliary buses having a bus-tie breaker entirely satisfactory service is obtained at less expense than with double buses.

To reduce the cost of synchronous condensers for voltage control a certain voltage drop is allowed in the direction of power flow. Where the power flow varies greatly from season to season the transformer ratios are changed seasonally to allow a greater voltage drop during heavy loads. Load-ratio control is preferred to individual circuit regulators for substations feeding country areas because it saves considerable money.

Company T — Attention is being devoted chiefly to developing rural lines at the minimum cost consistent with reliability and maintenance expense. High-strength conductors and long spans are reducing the number of poles, crossarms, pins and insulators.

Company U—Some 110-kv. lines have been built for about $5,200 per mile, including right-of-way, surveys and the usual overhead. High-stringing tension has been used in the conductors to minimize the height and number of supports. Double-armed H-frames with gaps in the pole down-leads are used. The latter protect the poles from shattering, while the double arm prevents dropping of conductors in case one arm is shattered. The last two lines have one pole extended so a ground wire may be installed if warranted.

Some 44-kv. pin type lines have been built for about $1,500 per mile, including overhead, and have given an excellent operating record. Long-span 13-kv. lines using steel-reinforced aluminum have been erected for $850 to $1,400 per mile, depending on the conductor size and terrain.



Storm-guyed structure on line designed for low cost, sleet and future demands (Company M)

Vibration troubles have been experienced that indicate lower conductor tensions are desirable, but recently developed conductor fittings, such as armor rods, dampeners and lighter dead-end clamps, will permit these tensions without excessive maintenance.

Comments from companies received too late for inclusion in this survey refer to methods of reducing tower-foundation expense, increasing reliability of lines so additional circuits will not be needed for service protection, contracting the construction of lines and greater use of outdoor and hydrogen-cooled rotative equipment.

Group Sales in Operation

Experiences and opinions of commercial managers on domestic market selling.

Specialty selling vs. group sales vs. electric home sales.

Opinions differ on merchandising methods.

WHAT do experienced merchandisers think about current practices and ideas for the development of the domestic market? A questionnaire was sent to a carefully selected group to find out and the replies form the basis of this article.

Undoubtedly merchandisers are seeking new ways and new methods to sell appliances and the majority opinion favors the development of the group sales idea; i.e., at one sale sell more than one appliance. Even beyond this the opinion prevails that the electric home or electric kitchen should be sold as a unit sales enterprise.

But practical merchandising plans to carry out these ideas are more or less embryonic. The merchandisers, as well as the industry, wait upon practical methods that can be applied in each locality to carry out the new ideas in merchandising.

An encouraging feature is that several properties have instituted group sales plans as supplementary to single appliance sales and that experiences to date, even though results are rather vague and methods imperfect, encourage the further development of these plans.

The practical difficulties that face group selling are many, including:

(a) Small down payments and long-time installment payments and the carrying of the time payment and carrying charges.

(b) Difficult to organize all sales outlets on a co-operative basis.

(c) Magnitude of the group appliance first cost means a limited consumer market until public acceptance is had for electric homes.

(d) Manufacturing and jobbing distribution set-up is based largely on specialty selling.

(e) Educational and training program for salesmen is expensive and difficult, the sales personnel must be of high caliber and salesmen's compensation must embody inducements for group selling.

(f) New appliances in the pioneering period are best sold through specialized effort and it is difficult to adjust this effort to group selling as public acceptance and sales saturation increase.

On the other hand, some of the advantages of group sales may be outlined as follows:

(a) The broadest market is obtained because consumer cost can be reduced through a reduction in distribution costs.

(b) Sales outlets now complain of inadequate margins when selling individual appliances and consequently do not develop the market aggressively. It is cheaper to develop both consumer acceptance and a sales mechanism for selling group appliances on a one-sale basis than by selling individual appliances.

(c) Present methods, largely devoted to individual appliance sales, have not developed the domestic market rapidly or economically. The principle of group selling at one sale has inherent advantages for developing all retail outlets on a profitable basis and for rapidly developing the domestic market.

(d) Preliminary to the development of public acceptance to the all-electric-home idea the group sale plan encourages both the idea and the development of a distribution mechanism that can carry it out at a later stage of development.

The replies to the questionnaire show very clearly that each community must devote serious attention to the merchandising problems involved in group selling before it can be said to be effective and practicable. It takes more than a paper program to make group sales. It is very evident that the majority of utility merchandisers like the idea and, at present at least, it lies entirely in their hands in each locality to act upon definitely and to develop over a period. The idea is sound, but it will take much hard and continuous work to make it effective. This work should be heartily encouraged, because in group selling lies the immediate promise for profitable merchandising and rapid market development.

Results of the Questionnaire

Question 1 — Do you believe the one-sale plan for groups of appliances is sound?

Yes, 25; doubtful, 3; no, 3.

Most of the favorable replies are unqualified in their answers, but two stress the idea as being best adapted to new homes.

One of the negative replies states: "Experience indicates that it is difficult to obtain a salesman capable of presenting a group plan inasmuch as it is a highly specialized problem. Likewise, experience has indicated that the fewer items a man has to sell, the larger and more satisfactory will be his sales volume." Another negative reply stated: "We have never been successful in this method of selling appliances. Invariably any combination of appliances set up met with the objection that the customer was always equipped with one or more of them and wanted to make a substitution, or was not particularly interested in one or more of the appliances offered." Another negative reply stated: "We have repeatedly tried group selling and the results have always been negative. Possibly the idea is sound, but it is difficult of execution."

Conclusion on Question 1—The large majority of replies favor group sales and in this majority are some of the most successful merchandising properties. The

negative reaction stresses the difficulty of execution of a group sales plan.

Question 2—Have you instituted such a plan? If so, what is your general conclusion as to its effectiveness?

Fifteen properties have plans in operation: the majority of these were started in the last two or three years. Ten properties favor the idea but have not instituted a plan as yet.

Some comments by the most experienced properties are as follows: "Easier selling; less expensive. When properly sold it results in better satisfied customers. More profit." "We have been featuring the plan for three years. It has resulted in a number of complete combinations of range, refrigerator and water heater being sold to one customer. Even though the average customer is not in a position to incur such a large financial obligation and must purchase the devices separately, the group idea keeps constantly before him the thought that his home is not completely electrified until all major devices are used, and also reminds him that he secures the lowest average rate only when all devices are in use." "Our group plan has been reasonably effective in the two years we have used it, considering the emphasis which has been given it." "We find it most effective where adequate wiring has been thoroughly sold."

Other replies indicate that it is difficult to find competent salesmen, that dealers have not adopted the plan in general, that extra special prices or extremely low terms are needed, that the market is limited.

Conclusion on Question 2—While the idea of group sales is considered good, only a limited number of properties have tried out the plan and their success has not been outstanding. Dealer relations, competent salesmen, lack of manufacturers' aid, credit determination, payment terms, combinations to use—all these elements make it necessary to develop the plan carefully in each region and indicate the time necessary for education and experience in sales and in co-operation of sales outlets.

Question 3—What is the plan you use?

In the majority of instances the range, water heater and refrigerator are grouped and are sold around the idea of an electric kitchen. Some properties advertise the all-electric home, with especial emphasis on the kitchen appliances. Others stress the rate inducement of full use and the convenience and economies of an electric kitchen. One or two offer a 5 or 10 per cent discount for group purchases. Another offers longer time for payments under group purchases of major appliances. Another offers both a discount and a longer time for payments.

Conclusion on Question 3—Creation of consumer demand through electric home or electric kitchen advertising, decrease in unit cost of service through lower rates, increased time for payments, increased discounts, these are the chief methods in use to make group selling effective. In nearly all cases group selling is applied to the range, refrigerator and water heater only or to a combination of two of these devices.

Question 4—What is your basis for compensating salesmen under the group plan?

Compensation for salesmen for group selling is the regular compensation in use. Only two properties give a bonus to salesmen for group selling. Six pay salary plus commission, three pay commission only, one pays salary only and two pay salary, commission and bonuses measured by load-building value of sales.

Conclusion on Question 4—It is very evident that adequate consideration has not been given to payments to salesmen under group-selling plans. In the majority of instances the plan is an option in the regular sales program and salesmen have no special inducements either to sell or to learn to sell group appliances. Payments based on salary, bonus and load-building values have been effective in group selling on two properties.

Question 5—What methods do you use with other dealers to secure their co-operation in group sales plans?

Several methods are used. One company pays 10 per cent commission for a sales lead that results in a sale, 15 per cent for a completed sale of a refrigerator and 20 per cent for a completed sale on all other appliances, including ranges. Another sets up dealer quotas at the time the plans are formulated. Another ties the dealer into advertising and campaigns and sells appliances to dealers for 20 per cent discount if these are needed by the dealer to complete a group sale. Another pays 25 per cent commission to dealers, furnishes a display room and carries the time payment paper. Several install range wiring without charge for dealer sales. Another consigns appliances to a selected group of dealers, paying them 20 per cent commission and carrying their time paper. Another says: "We co-operate with dealers by maintaining trade-ins, avoiding discounts, by doing co-operative advertising and promotional work, but we sell competitively.

Conclusions on Question 5—Practical plans for dealer co-operation are difficult to find. Few dealers have tried group sales. One objector to group sales points out that the necessity for long time payments creates a bad dealer situation. Other properties solve this problem by carrying dealer time paper. One or two examples show definitely, moreover, that practical dealer co-operation can be obtained in a local area for group selling.

Question 6—What combination of appliances do you find sell most readily as a group?

The range, refrigerator, water heater and washing machine are favored as group appliances. By far the larger number combine the range and refrigerator or the range and water heater. Small appliances have not been grouped or sold as a group with any aggressiveness. Washers and ironers are also found to be a favored combination.

Conclusion on Question 6—It is very evident that group sales, as practiced, are limited to two or three appliance combinations usually. The idea has not been carried out in any major degree to list several combinations of appliances or even to group the kitchen appliances as a unit.

Question 7—What is the time-payment period and monthly payment basis under your plan?

As is to be expected, a wide variety of practices occur. Some are as follows: Ranges, 20 months; refrigerators, 24 months; water heaters, ten months; 10 per cent down and 24 months; 36 months with 5 per cent discount for 24 months; 10 per cent cash and 24 months; 36 months with 5 per cent down; 24 months; 36 months; 30 months; 10 per cent down and 30 months; 5 per cent

down and 36 months; 10 per cent down and 24 months; 10 per cent down and 18 to 24 months; 30 months; 10 per cent and 24 months; 10 to 18 months; variable with revenue value, but maximum of 36 months; 10 per cent down, 18 months and 2½ per cent plus one-half of 1 per cent straight line monthly interest carrying charges.

Conclusions on Question 7—It will be seen that at least 10 per cent down payment plus 36 months is the usual practice in time payments. An interesting development is the use of revenue value as a determining element in arranging time payments to give 12, 18, 24 and 36 monthly time payment arrangements. An adequate down payment is essential to success with group sales.

Question 8—Do you believe a sales plan based upon selling an electric home or individual rooms in a home is better than one based upon the sale of groups of appliances?

Some utilities do not sell lighting equipment and therefore favor selling the kitchen and groups of appliances. Other utilities say there is little in group sales except the combination of the three major appliances, range, refrigerator and water heater. Another states: "Both have merit. Selling an individual room at a time will not present a very balanced use. Selling the entire home should be primary."

Conclusions on Question 8—The majority favor group appliance selling as applied to the three major load-building devices, but a strong sentiment exists for selling the electric kitchen and the electric home as unit sales. No evidence exists of practical accomplishments in selling either the home or the kitchen in any volume or as a continuous effort while group sales plans are in operation.

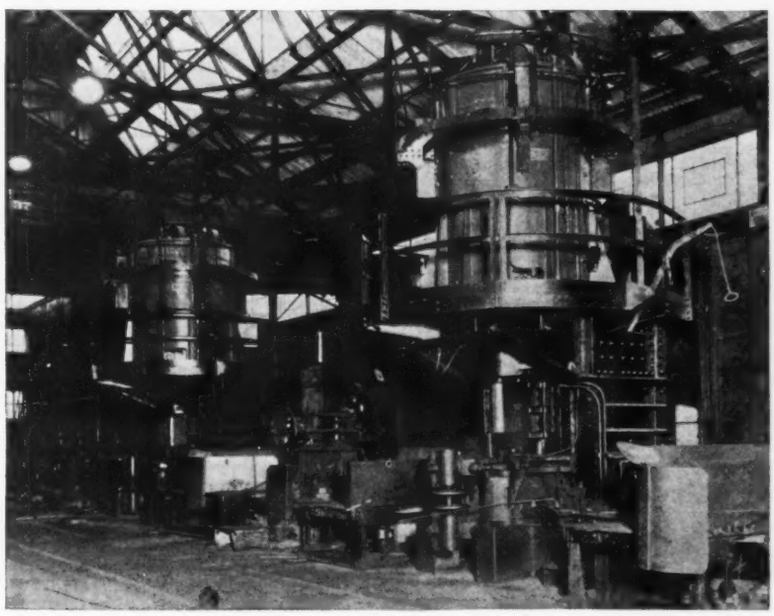
Question 9—In the light of your experience, what do you believe to be the merchandising plan that will develop the domestic market most rapidly and economically?

This question opened the door wide and a summary of some replies indicates the thinking of active merchandisers. One says: "Well-trained sales organization, working in close harmony with dealers; well-planned advertising and a clean stock of standard items of merchandise." Another says: "The stress of the times makes it necessary to sell major appliances individually rather than in groups, and this is the soundest merchandising policy. Quite frankly, we are not interested in a group plan because we do not want to disturb unduly the dealer situation." Still another says: "Now we are dependent upon individual appliance selling, but as the group plan progresses this undoubtedly will be a major factor in developing the domestic market most rapidly and economically." Another says: "Small down payment, lenient terms and careful credit." Another is definite with systematic canvassing one-half day, working on live prospects one-half day and closing sales at night." A broader reply is, "an educational program in each community to create consumer demand for the fullest use of appliances. The customer must then be given the opportunity to buy approved merchandise at more than one retail outlet and on terms he can afford." Another says: "Sell service rather than appliances." Still another: "Sell the idea of the electric home, replace refrigeration and range bureaus with an electric home bureau." Another statement is: "Adopt a policy that encourages the maximum number of successful retail outlets with the utility emphasizing load-building and promotional appliances." Another suggestion is: "Develop a home-service plan that will reach every customer." Another says: "Use specialty selling and keep at sales continuously."

Conclusions on Question 9—A sharp division exists as to practical merchandising. One group believes in concentration on the individual or group appliance sales and another favors the sale of the electric home as a unit. No definite suggestion for a merchandising mechanism was made except the specialty sales organization now used. A general belief exists in advertising to create consumer demand and co-operative sales efforts.

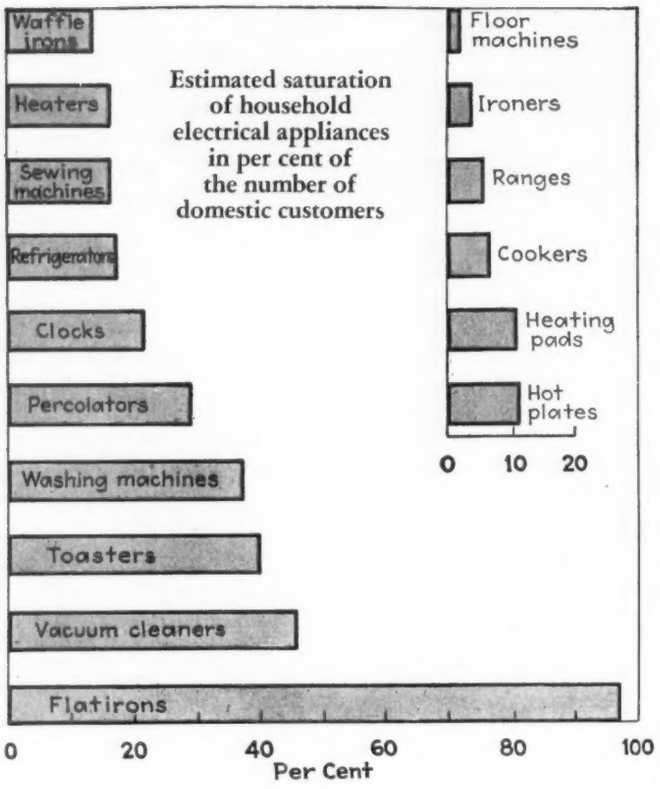
▼ ▼ ▼

Vertical-Roll Bar Mill Driven by Two 800-Hp. Motors



Courtesy Westinghouse Electric & Manufacturing Company

Possibilities in the



CONTINUED expansion in the use of electricity for domestic purposes, progressive farm electrification and in numerous local instances the acquisition of new power loads, even during 1930 and 1931, illustrate the possibilities of the market for increased energy sales and for electrical goods. They point to some of the direction in which these markets will be developed in the future. The magnitude of those possibilities is shown in the accompanying charts.

The representations of present conditions call for no explanations beyond the statement that the totals of energy sales and central-station revenue are based on statistics for 1931. The allocations differ somewhat from those that have been published in the past in order to call attention to items now of minor importance that give promise of future large increase. Though in part estimates, with respect to these smaller items, where accurate figures were not available, the general picture is essentially correct. The values of customers' installations are necessarily estimates, but, it is believed, reasonable estimates.

Now as to the potential market. The domestic market offers the largest possibility of rapid expansion. For the domestic energy sales a moderate increase in the number of customers and an average consumption of 3,000 kw.-hr. per customer will give the estimated total. Averages as great as 4,000 kw.-hr. have been attained, though not, so far as known, for larger groups than a good-sized city. Individual instances, of course, run vastly higher. Details were recently published as to one installation using 10,000 kw.-hr. annually, in a house not unusually large.

The possibilities of increase in the use of domestic appliances are evident from the chart showing per cent saturation. It is based on a comparison of the estimated number, according to *Electrical Merchandising*, of each kind of appliance in use, with the total number of domestic customers.

Next in order comes industrial heating. A survey some years ago indicated potential sales well in excess of the 63,000,000,000 kw.-hr. here adopted. With the widening prospect for the use of new alloys, presumably to call for electrical energy on a large scale, the retention of this figure is abundantly justified.

Third in the order of potential increase is the use of electricity on the farm. Present use is based on a study of 24 companies for which statistics are at hand. One of these was omitted from consideration because of its exceptionally large average per customer. The others gave an average of 1,603 kw.-hr. Excluding one with an average of 7,430 kw.-hr. as also exceptional, there remained an average of 1,270 kw.-hr.

For estimating the potential market 1,500 kw.-hr. has been considered a reasonable possibility. Some will use less, others far more, some none at all. The number of farms approaches 6,300,000. Using, in round numbers, 6,000,000, there results a total of 9,000,000,000 kw.-hr.

It is not necessary to go into details regarding the potential increase of other loads, which, after all, does not bulk so large in the difference between present sales of 73,020,000,000 kw.-hr. and the potential 264,300,000,000 kw.-hr.

Applying conservative unit rates to the energy sales in the various classes of business, in general well under those now prevailing, the conclusion is reached that there is a potential revenue from ultimate consumers of $4,724,500,000, against the $1,977,000,000 of 1931.

The additional customers' equipment to make use of the increased energy represents an estimated increase in investment of more than $4,400,000,000, from a present $2,501,000,000 to $6,980,000,000. To this must be added a sum, about equally large, for increased electrical equipment to be owned by central station companies—not only generators but transformers, control, substation, line, customers' service and other equipment.

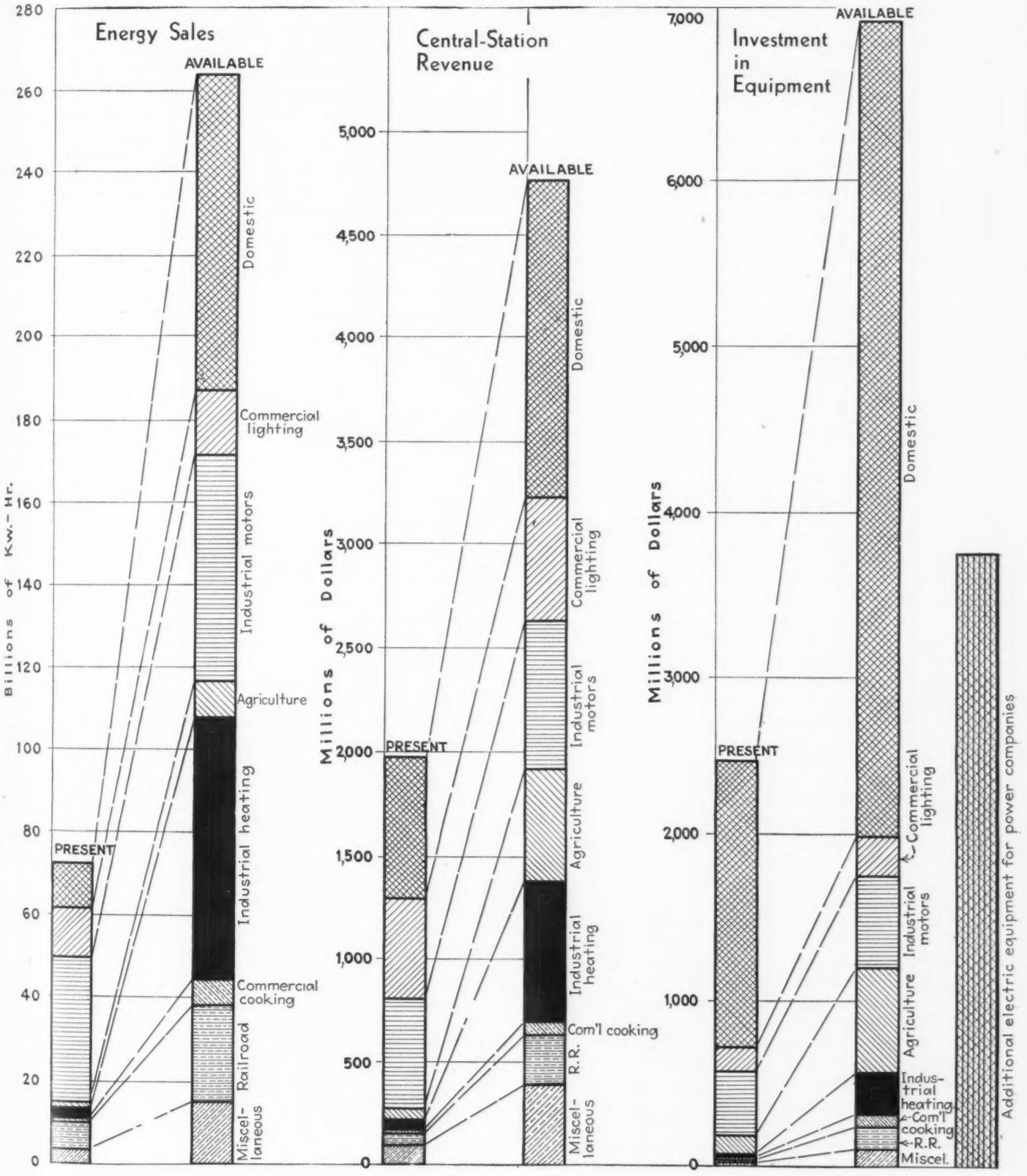
The conclusion is that this potential load represents to the electrical manufacturing industry the tremendous total of $8,000,000,000 and to the central-station industry an annual revenue in excess of $4,000,000,000.

Business Possibilities of Various Electrical Markets

	Kilowatt-Hours (Millions)		(Millions of Dollars) Annual Revenue		Customers' Investment	
	Present Business	Available Business	Present Business	Available Business	Present	Potential
Domestic	11,800	76,700	690	1,535	1,800	5,000
Commercial lighting	11,400	15,800	490	600	150	220
Industrial motor load	35,100	55,000	520	715	380	560
Industrial heating load	3,500	63,000	55	685	10	150
Commercial cooking	430	6,300	13	64	6	90
Railroad and railway	6,400	23,500	50	235	105	730
Agricultural	890	9,000	57	500	30	120
Miscellaneous	3,500	15,000	102	390	20	110
Total	73,020	264,300	1,977	4,724	2,501	6,980

Electrical Market

Large possibilities exist for increasing energy use, revenue and the sale of domestic, industrial and power equipment. All branches of the electrical industry will benefit.



Bright Spots in Power Sales

What has been accomplished recently.
Where the new business came from.
Significance of achievements.
Where activities will be directed.
Some factors that will affect success.

FACING the facts is essential to the adaptation of activities to changed conditions, but continued retrospection or brooding over difficulties can become the heaviest anchor on progress. What would any of our early pioneers have accomplished had they forever concentrated their attention on the stupendous obstacles they faced in extending the frontiers of civilization? Probably nothing. Instead, they visualized a goal, struck out into the unknown, and each step enhanced their courage. That is the spirit we need now instead of the persistent comparison of current accomplishments with those of an unusual period.

The electrical industry has a rosier goal to contemplate than those pioneers whom it should be trying to emulate. And it isn't a fixed goal, but one that is continually expanding. The industry has achieved results on which greater accomplishments can be based. It has experience. It knows that the American people will never be satisfied with anything less than they had before and that the desire for new things will never cease. But the interesting fact right now is that, despite business conditions, some of these opportunities are being capitalized, when some people believe no new business is obtainable.

The present cloud has numerous rays of sunshine showing through, if they are only searched for. They should give encouragement for the next twelve months and future activities, and if sought by every company will serve as the basis for sales reorganization and selective selling which will not only bring immediate results but open up an enormous market as business improves.

To prove there is basis for encouragement, let us pass over the domestic market, which recent experience has shown and most people recognize offers the greatest immediate possibilities, and consider only the commercial and industrial field, about which there is more question. Statements of how much business is being secured and where it is found will be based on actual accomplishments of operating companies serving more than 4,000,000 customers. These are in territories which have felt the brunt of business conditions as much as any.

One is a Middle Atlantic company (A) serving more than 500,000 customers. In 1931 it signed up *new* commercial and industrial business with an estimated annual revenue of $2,167,000, of which $632,000 comes from commercial, industrial, flood, sign and street lighting. This added lighting business is 17 per cent more than was acquired in the boom year 1929. Nearly 65 per cent of the new power business came from existing customers, 19 per cent from miscellaneous power loads and 11 per cent from replacing isolated plants. About half of the lighting business came from commercial applications and 35 per cent from industrial and flood lighting.

While company B, in neighboring territory and serving about 300,000 customers, did not estimate its added revenue, it secured in 1931 nearly 41,000 kva. additional commercial and industrial connected load, compared with nearly 47,000 for the previous company. Although the iron and steel business is down, nearly 8 per cent of this new business came from that field. The majority came from a diversity of applications.

Take another Eastern metropolitan company (C), not usually considered as having large industries, and it added in 1931 more than 35,000 kw. in new commercial and power business, of which 12 per cent was in new commercial and industrial lighting. The new commercial lighting registered a gain of 7 per cent over 1930 acquisitions. Twenty per cent of it was for electric signs. New commercial cooking and baking business was 34 per cent higher than in 1930. Replacement of small, isolated plants added more than 2,000 kw. and commercial and industrial heat applications more than 1,600 kw.

Heat applications are being secured

Jump out into the middle West to a territory which has suffered as much as any from business conditions, and one company (D) added $326,000 estimated annual revenue from heat treating, gray-iron melting and duplexing and stereotype melting alone. These uses ranked 40:39:21 in contributing to that revenue. Many owners of isolated plants have found their overhead expenses too large for the decreased output and have substituted purchased power.

Further west, in a territory comprising about 300,000 customers, company E stimulated 386 new installations and replaced either totally or partly sixteen isolated plants, bringing an added yearly revenue around $200,000. Improvements in lighting installations brought an additional $45,000 annual revenue, or 18 per cent of the new business cited. The entire industrial heating load was increased 4½ per cent last year, and the commercial cooking business, already claimed to be the largest in the United States, was increased 7.7 per cent in the same period. Air conditioning figured prominently in the new business, one ten-story building completely equipping with this modern facility.

In about this same longitude is company F, with about 65,000 customers, which developed new lighting business with an annual revenue slightly over $106,000, or nearly 19 per cent more than it obtained in 1930. New store lighting contributed nearly half of this revenue, while floodlighting, electric advertising and office lighting contributed 19 and 11 per cent respectively. All acquisitions except industrial lighting showed increases over the year 1930, electric advertising increasing 71 per cent, floodlighting 20 per cent and office lighting 12 per cent.

The year 1931 was this company's best so far in acqui-

sition of commercial cooking load, the annual revenue added being more than $20,000, or 21 per cent more than that secured in 1930. Commercial and industrial power business added more than $132,000, over one-third of which came from diversified power loads and 17 to 10 per cent respectively from hotels, hospitals and buildings, meat packing, ice companies and transportation.

The increase of business in commercial cooking was attributed to (1) well-organized information files and follow-up system; (2) diligent and consistent salesmanship, and (3) appropriate demonstrations and direct-mail assistance. Among the factors affecting the acquisition of power business were very favorable rates, rental of equipment in some cases and reciprocal patronage.

Coming back into the Eastern coal region we find that company G, with about 57,000 customers, added $109,000 annual revenue from 30 new power contracts, including displacement of isolated plants. The greatest gain in new business came from textile plants, but stone quarries and ice plant business made substantial gains.

Down in the Southeast, in a territory with about 150,000 customers, company H added virtually $600,000 annual revenue from commercial and industrial sources. Textile mills, diversified power applications, ice plant and creameries, and hotels, stores and office buildings contributed 75 per cent of this new business and ranked in the order named. However, the biggest increases in new revenue over 1930 came from grist mills (24 per cent), ice plants and creameries (21½ per cent), woodworking plants (20 per cent) and cotton gins (19 per cent).

Although the low price of metals has hit the Rocky Mountain industries, company I, which represents an average cross-section of that territory, reports that the total revenue from all classes combined has continued to show an increase, despite losses in power revenue, particularly from mining.

Two widely separated sections of the United States, which are not primarily dependent for income on large manufacturing industries, but rather on diversified small industrial, and commercial, residence and rural load, illustrate conditions in such territories. Company J, in the East, reports that its business never booms and never falls greatly, but a number of small steam-engine plants faced with smaller business activity and stronger competition have had to reconsider their power costs and have electrified to use purchased power. In the extreme West company K reports that it added $78,000 annual revenue in 1931 from new business on about 2,300 miles of rural line alone, due chiefly to applications of power outside the farmhouse.

A group of affiliated properties (L) serving over 500,000 customers, signed up in 1931 new street lighting, commercial lighting and industrial power business with an estimated annual revenue of $3,300,000, of which power business represented nearly 35 per cent increase over 1930. The increase in lighting revenue was due largely to general relighting campaigns in February and September, sign- and flood-lighting activity in April and emphasis on store-window illumination in October. Trial installations, participated in by dealers, assisted greatly.

Instead of experiencing a drop in commercial and industrial business since the first of 1931, company M, on the Pacific Coast, signed up $590,000 worth of new business from this field during the first four months of this year. This is due to aggressive salesmanship and is quite the reverse of results obtained where companies have sat back and said, "What's the use of trying to sell when the public has no money with which to buy."

Table I—19 Per Cent More New Business from Commercial Lighting than in 1930 (Company F)

Class of Lighting	Estimated Annual Revenue Added		No. Installations Added		Kw. Added	
	1931	1930	1931	1930	1931	1930
Store.....	$49,121	$45,968	150	74	526	334
Flood.....	19,590	16,399	90	49	435	441
Electric advtg.	16,776	9,727	130	79	178	78
Office.....	11,418	10,057	20	16	354	131
Specials....	4,758	160	18	...	969	107
Industrial..	3,535	6,615	20	7	48	160
Home.....	913	564	13	20	30	24
Total...	**$106,111**	**$89,490**	**441**	**245**	**2,540**	**1,275**

Significance of results

The evidence presented indicates that even if new customers are not available, a very substantial increase in new business can be derived from existing customers by maintaining personal contact with them and studying and helping them with their problems. As the sales manager of company G says, "The outstanding value of a power salesman lies in his ability and opportunity to be of distinct service to a customer. He can make suggestions for improvement of the customer's operations which many times results in valuable uses of purchasing power and can advise the customer regarding the most advantageous form of rate. He can even take an interest in promoting the customer's business by suggesting his products to others. If the power salesman is honest, efficient and visits the customer regularly, he will build up confidence that will stand him in good stead when the customer desires to expand, purchase additional power or if he ever becomes interested in isolated plant operation. It is this confidence that makes it possible for a utility to expand and hold the business it already has."

Another thing which the foregoing data indicate is that changed business conditions make it necessary for isolated plant owners to reanalyze their costs and reconsider purchased power. Particularly is this true where an isolated plant has passed its economic life or where decreased output has reduced economy and made the total operating expense too great compared with purchased power.

While many of the companies cited have been able to derive a large percentage of their new commercial and industrial business from power applications, it is impressive that such a large percentage of the new revenue has been obtained from commercial lighting, including stores, flood, electric advertising and office buildings. The increases over 1930 and 1929 revenue (companies A and F) for such lighting indicates that these are applications which should have major considerations in this year's activities.

Where municipalities are tempted to reduce their appropriations for street lighting to balance their budgets they will have to be shown the shortsightedness of curtailing so essential a service. And merchants who show a reluctance to invest money when sales are not increasing will have to be shown that higher lighting intensities and electric advertising will divert more business into their stores.

Diversified power applications, which cannot be classified under the usual subheads of new business, bulk so large in numerous instances as to show that power com-

panies must not overlook the miscellaneous applications if they are to secure the maximum new business. The combined effect of a large number of small applications may become a very sizable total.

Probably the major increases in industrial business will come from uses which require only a moderate investment in equipment. It may be necessary for the utility to arrange the financing of industrial investments in electrical equipment if large headway is to be made.

Commercial and industrial heat applications, long talked about as possessing potentialities equal to the present motor load, have contributed new revenue to a number of companies. The acquisition by one company (D) of $326,000 new revenue from heat treating, gray-iron melting and duplexing and stereotype melting shows just one source of untapped revenue. Any customer that uses metal in its products is a prospect for some form of heat treating, enameling, etc. Many small heat applications, which are not confined to metal-working plants, steel mills or automobile manufacturers, can be found if power salesmen search for the fuel-fired processes which can be more economically or conveniently handled in the electric way.

Commercial cooking and baking possibilities are shown by the fact that company E, which claims the largest load of this character in the United States, was able to increase its total 7.7 per cent in 1931, and that both companies C and F increased this business greatly last year.

Still another significant fact is that a business which is down like the iron and steel field would still contribute 8 per cent of the *new* business of company B. If this field can justify new uses of energy, others in a similar category can do likewise. They only await the evidence of the economic value to make them adopt new uses and power salesmen should be able to produce the figures.

Ice plants and creameries are reported by some of the companies as contributing sizable new increases in revenue. Such plants are not limited to the companies mentioned.

Mention of the textile factories as major sources of new business by two companies (G and H) suggests that business indices of different industries be watched by all utilities. Those industries which have the best demand for their products should be the best prospects for new uses of energy. Current indices have long shown food, chemical and metallurgical industries to be on a high productive plane. The new chemical processes in which electricity is essential open up new opportunities for the use of electrical energy. The seeker after this business need only read papers presented before the American Electrochemical Society to visualize the opportunities there.

A paradox exists in some industries which may work to the advantage of the electrical industry. It is that production has greatly increased in some industries, although the revenue has not risen appreciably, due to volume sales at low-unit prices. Hence it is not correct to assume that no industry is interested in economical means for handling increased production, but unlike in boom periods the factories are more interested in the most economical ways of handling this volume production, so low-unit prices will also bring a profit.

The foregoing bright spots in recent commercial and industrial business could doubtless be multiplied if a complete survey were made of the utility business. They indicate that substantial increases have been made in new-business revenue even when the domestic revenue is excluded from consideration and show where this business is coming from. These few examples suggest that each individual company analyze where other companies are getting their increases in business and also where their own efforts have been most successful. With this information and a vision of which applications have the greatest development possibilities fields for concentrated attack can be selected and the sales personnel reorganized to increase revenue this year and lay a firm foundation for long-pull developments.

Table II—Heat Applications Added New Revenue in 1931 (Company D)

Class	Estimated Annual Revenue Added	Estimated Thousand Kw.-Hr. per Year	Kw.
Heat treating	$129,600	$10,800	3,000
Gray iron melting and duplexing	126,000	10,500	3,500
Stereotype melting	70,000	5,760	1,200
Total	**$325,600**	27,060	7,700

Sales activities for coming year

This year utility sales managers see the greatest opportunity for development of commercial and industrial business in applications of air conditioning, commercial and industrial electric heat processes, commercial cooking and baking and commercial and industrial lighting. Possibilities of shutting down more isolated plants are enhanced by the reasons previously mentioned and encouraged by the successes last year. Substitution of compressed air for steam hammers and presses and encouragement of improved material handling to reduce production expenses are seen as other opportunities.

Air conditioning is given first place in market opportunities by nearly every sales manager in the companies cited and will be given major attention in sales effort this year. As company A says, there are widespread opportunities for application in industrial plants, theaters, department stores, restaurants, office buildings and banks, and there are indications that this application will spread to hotels, apartment houses and individual homes. Development is readily susceptible to sales effort. At present a co-operative selling campaign is being conducted with manufacturers on air conditioning for stores and restaurants, believing that they represent the best prospects now and because the present season is the proper one for this type of activity.

Company D had 170 inquiries in the last few weeks and expects that a number will result in sales. Here is what it says:

> Prospect of increased load continues to be from new uses by existing customers. Air conditioning probably comes first on the list. There is more commercial, engineering and popular interest in this than in any of the other applications and its encouragement offers new hope to the ice people, builders of refrigerating machinery, fans, motors, etc.
>
> Already a considerable tonnage of ice is being used for air conditioning in Kansas City, St. Louis and some of the Southern cities. The first cost is low and there are no attendants. It is, in fact, the central station idea applied to air conditioning. It also means an earlier acceptance and quicker acceleration of this load because of freedom from investment costs and responsibility and offers utilities the same or better load building. A place like our ——— Street office, for example, would on a hot day consume about 360 kw.-hr. stored in ice and around 50 to 100 kw.-hr. to operate fans and blowers.
>
> The cost of equipping a commercial place for the use of air

conditioning by ice is so small and the acceptance and need for cooling are such that we expect a quick growth of this method.

For domestic use, and in individual small offices, dentists' and doctors' offices, etc., there is a unit like a radio cabinet which will contain 200 lb. to 300 lb. of ice. The cabinet can be wheeled about like a dining room serving table from room to room, or to the freight elevator and down or out for icing. These little units do a good job of dehumidifying and cooling and besides the kilowatt-hours stored in the ice they will use 2 or 3 kw.-hr. per day driving their pump and fan. We predict that hundreds of these will be sold.

The ice man has learned his lesson. He is thinking and acting a lot of "customer relations" and his delivery methods are so much improved that these units will be accepted. They will sell for $90 to $150 and will find hundreds of uses before the more desirable small mechanical unit is available at a popular price. Hotels will have these units in the basement ready to move up to cool a guest's room for a dollar or two per day extra charge. The ice men expect their business to double in about five years, and of course we hope to sell current for all their use. Adding all the fan and pump load gives a fair prospect for summer load, tending to offset a growing winter seasonal use by industrials.

Table III—Where Three Companies Secured Their New Business in 1931

(Company A)

Commercial and Industrial	Estimated Annual Revenue Added	Thousand Kw.-Hr. Added	Kw.
Additional load and existing customers		78,566[1]	
New power load other than that listed elsewhere		22,940	
Closing isolated plants		13,322[1]	
Temporary loads		7,083[2]	
Air conditioning		10,420	
Industrial heating		819	
Total	**$1,535,000**	124,150	
Lighting			
Commercial			5,670[3]
Industrial and flood			3,697[4]
Sign			898
Street			232
Total	**$631,900**[5]		10,497
Grand total	**$2,166,900**		

[1]15 per cent over 1930. [2]100 per cent over 1929. [3]130 per cent over 1929. [4]17 per cent over 1929. [5]12 per cent over 1929.

(Company H)

Nature of Business Added:	Annual Revenue Added	Per Cent Added in 1931
Textile mills	$176,724	4.9
Miscellaneous	161,639	15.1
Ice plants and creameries	65,855	21.5
Hotels, stores and offices	45,401	3.0
Cotton gins	33,960	18.8
Mining	28,375	10.4
Quarries and finishing plants	17,869	8.8
Utilities	17,000	3.2
Cotton oil and fertilizer	13,980	2.9
Woodworking	11,088	20.0
Grist mills	10,658	24.0
Water pumping	7,210	2.3
Foundries and machine shops	4,896	1.6
Clay products	3,990	3.3
Packing plants	360	1.7
Total	**$599,005**	**6.24**

(Company F)

Class	Estimated Annual Revenue Added	Hp. Added
Miscellaneous	$44,963	1,845
Hotels, hospitals and bldgs	22,350	950
Meat packing	20,500	850
Ice companies	16,500	576
Railroads and transportation	12,750	788
Grain handling	9,100	1,249
Water pumping	6,000	550
Total	**$132,163**	6,808

Refrigerator builders, of course, are as active as are the ice people. Frigidaire now has a nice cabinet type room cooler. It had about 100 orders practically closed for delivery early in 1932. These will have 1½-hp. motors and consume about 20 kw.-hr. per day in hot and humid weather. Frigidaire expects to sell 1,000 units in this city in 1932. Add to this General Electric, American Blower, Carrier, Kelvinator, etc., and you have some idea of what this air-conditioning load is looking like.

So far as commercial and industrial heat applications are concerned, the most promising possibilities right now are in small heating units and devices such as melting pots, soldering irons, small space heaters, immersion heaters, etc., according to company A. Surveys of the market are being made by company C and a study will be made of applications in each type of industry. Very definite trends toward use of electric gray iron are reported by company D, which also expects increases in electric heat treating and forging. This company has a metallurgist in its sales department who spends considerable time with the foundrymen in large factories and co-operates with them in everything having to do with metallurgy, particularly those processes involving electricity. A load of 15,000 to 25,000 kw. in electric gray iron melting is expected in the next few years.

While electric welding has become very popular with users, company D points out that some of the large welders impose conditions which make them very unattractive as loads. For example, some large welders impose demands of 3,000 kva., but bring a revenue equivalent to that of a 25-hp. motor. To avoid voltage bumps it is frequently necessary to ask the users to install equipment which will smooth out these demands.

Commercial cooking and baking afford very promising new business, in the opinion of most sales managers, and, as previously mentioned under achievements, even company E, which claims the largest load of this character, made very substantial increases in the business last year. Such business is most readily available, says company A, where there is already considerable use of electricity and additional energy can be sold on the increment basis. Counter devices, using electric heat, will be particularly pushed by company C in restaurants, drugstores, etc. Stimulation of commercial cooking, baking and other commercial heat applications will constitute a major part of most companies' sales effort this year.

It is not surprising, after the success attained in increasing revenue by commercial and industrial lighting, that sales effort will be strongly directed along these lines this year. Included in this category are flood, sign, street, office, store, show-window and airport lighting. By going over new plans for lighting before decisions are made most companies expect to secure more than the originally intended load.

There is no question but what all illumination intensities in industrial plants could be increased to the advantage of all concerned, says company A, and the possibilities of floodlighting have not been fully developed. Increased effort by personal salesmanship and advertising with intensified effort to increase the installation of time switches for controlling show-window and sign lighting will be exerted by company C to increase the load factor of a large number of commercial users.

Even in territories where the utilities have heretofore considered that they have replaced most of the isolated plants which can be shown an economic saving by purchasing power, renewed efforts will be made to reduce the number of remaining installations as the reduced

output and the corresponding reduction in economy, coupled with the increased overhead and operating expense per unit of energy, make it necessary for isolated plant owners to reconsider purchased power. The shifting of load from sixteen such plants last year to purchased power makes company E particularly hopeful of opportunities in this direction. Company C has established a bogey for this year of shutting down one isolated plant a week, and it may possibly help the owners in financing the changeover.

Factors affecting sales approach

While two of the companies cited indicate that some new business may be secured by co-operating with local chambers of commerce in attracting new industries or new plants brought about by decentralization of some industries, emphasis is placed by most companies on the value of existing customers as sources of new load. Their recent experience shows that this is the most fertile market and it is chiefly a problem of studying their operating requirements, suggesting ways in which they can solve them by electrical means, and presenting evidence of the economy.

It is impossible to maintain maximum sales effort on all important applications over the entire market simultaneously without increasing sales personnel beyond the economic limit. However, it is feasible to push particular applications in selected fields continuously so as to have a directed sales program in progress throughout the year, covering various applications during the most appropriate seasons. By subdividing these fields into selective groups it is possible to utilize direct-mail advertising, coupled with prompt follow up by representatives of the utility and manufacturer.

More personal selling is essential to produce the best results. Selling must be done on the premises of the customer. He cannot be expected to respond to advertising alone. The problem is to get enough man-power to cover the market and pay salesmen in proportion to the value of the load developed.

Personal selling is aided by the territorial representative plan, which has been followed by company B, and doubtless others. Each salesman is assigned to a specific territory for which he is responsible. He covers all classes of commercial or industrial business, as the case may be. The close contact which he can keep with his customers and prospects has been found very effective.

Demonstrations or trial installations have been helpful and may be increasingly more important. It may be necessary to give financial assistance to customers to adapt their installations to purchased power or make costly new applications, as has been done by two companies in some cases. Adaptation of rates to competitive situations needs serious consideration according to one company.

Unco-ordinated sales and advertising of manufacturers, contractors-dealers and utilities limit the results which can be obtained in a field already complicated by a large number of customers and diversity of business. One solution lies in the development of co-operative advertising and co-ordinated sales. Company A expresses the opinion that this approach should be directed in that part of the field which offers the best opportunities for selling, using the results secured as an additional selling tool in succeeding efforts. As previously mentioned, this company has applied the method to air conditioning, and expects to follow this campaign with one on applications of small electric heaters used in various phases of industrial work.

Companies which may be discouraged over the effect of rate reductions on revenue may find encouragement in the experience of Company J. Last year a rate reduction was offered commercial lighting customers which would result in a reduction of about $160,000 annually in commercial lighting revenue. The rate has been in effect slightly over one year and already the sales and revenue have increased so the loss in revenue will soon be wiped out. At the end of the first six months the sales were 4 per cent over the corresponding period of the previous year, but the revenue was 2 per cent under. At the end of twelve months the revenue was still 2 per cent under, but the sales had increased 6 per cent over the corresponding period of the year before. At the end of March, 1932, the revenue was 3 per cent over and the sales 13 per cent above the same period of 1931.

With this promotional rate the company accomplished two things: (1) Increased sales of commercial lighting and also the revenue; (2) convinced the customers that low-wattage lamps and shorter burning hours do not increase his business. The customers have been shown that adequate lighting of stores and longer burning hours for both window and store displays increase their business.

The present situation brings out clearly a real need for intelligent market surveys of all classes of prospective business. Sales effort will have to be concentrated on the best prospects available, and this is only possible by basing selection on survey data.

Completion of successful sales programs this year will require exceptionally well-trained salesmen who are endowed with an abundance of resourcefulness and ingenuity. With exceptions, of course, the current sales job is not one of providing additional productive capacity, but to assist customers in cutting their over-all costs through the adoption and economical use of purchased power. More than ever before will salesmen have to place themselves in the position of prospective customers and clearly visualize their problems. Proposals to use additional energy will not be graciously received unless it can be demonstrated very clearly how such procedure will mean net improvement in customer earnings.

Conclusions

Men on whose shoulders rest the responsibility of sales production, who have been quick to recognize these changed conditions, have been the first to readjust themselves and fit their organizations and methods to the changed conditions. They are now looking forward and upward with every confidence in the future. Only those who have tenaciously clung to antiquated methods of prosperity days are finding themselves the recipients of constant and continuous hard-luck stories, weather reports and alibis which are being presented by their own and other selling organizations, in lieu of production.

The business which has been obtained can be most useful in bringing in the more difficult cases. Strong sales effort put forth at this time will reap a tremendous harvest when business conditions begin to regain a more normal level. While it may be difficult to show results immediately, it is extremely important to lay a strong foundation on which to build future sales.

What we need now is faith in the future and well-directed hard work.

Merchandising Co-operation in Action

PENNSYLVANIA is doing something very practical in co-operative merchandising. Under the leadership of the electric and gas utilities positive action has been taken to clarify the present complex system of distribution and to bring co-operation into action between the 35 different types of retail outlets. The basic approach has been that the domestic market is enormous and should be developed rapidly through sales by all outlets under fair competitive conditions. In Pennsylvania the utilities sell only from 10 to 30 per cent of the appliances, depending upon the local territory, and they realize the importance of having other outlets prosper and aid in the development of the market.

The start of the movement was to call a meeting of the gas and electric utilities through executive representatives who had the power of decision. At this meeting the principles of merchandising announced by the National Electric Light Association and the American Gas Association were studied, applied to Pennsylvania conditions, rewritten and made more specific. The conclusion of this work, after a number of meetings, was the adoption by qualified utility representatives of eleven principles of merchandising to be applied in Pennsylvania. These principles, with slight modifications, became the individual policy of practically all of the utilities in Pennsylvania. They were announced publicly and were suggested to other agencies.

The next step in the program required each utility to apply these principles in its local territory with such minor modifications as were necessary to make them more practical and more specific. This has been done, with a negligible number of exceptions, and all employees of the utilities and other retail agencies have been informed of the principles and the interpretation of them as applied to practical merchandising in the local territories. In some instances a further development has been local organizations of the retail outlets to carry out the principles in greater detail and to develop co-operation in sales more adequately.

Pennsylvania merchandising principles

The eleven principles agreed upon for statewide application are as follows:

1. (a) Gas appliances offered for sale shall bear the seal of approval of the American Gas Association Testing Laboratory.

(b) Electric appliances offered for sale shall be of such manufacture as to assure safe and dependable service.

This first principle deals with quality of appliances and obligates the utilities to sell only merchandise of high quality.

2. The utility shall sell only gas- and electricity-consuming appliances and the auxiliary equipment necessary for their complete installation and use.

This principle obligates the utilities to refrain from expanding merchandising sales into non-electrical fields.

3. (a) The utility shall recognize as the proper retail cash price of any appliance an amount that allows a logical merchandising outlet (selling at that price) a gross profit not less than is customarily obtained from its discount on such item.

(b) When the utility establishes a special price on an item it shall provide that such item may be purchased by any logical merchandising outlet at its customary discount (applied to such special price), subject to the supplier's usual credit, franchise, sales and other conditions applying to the regular sale of that item.

(c) The foregoing is not intended to apply to shopworn, damaged, repossessed or obsolete items.

This principle means that the utilities will maintain the manufacturer's list price when one exists and, in cases where list price does not exist, will add to their cost of any appliance a sum that will result in a selling price with which the dealer can compete without losing his customary profit. It also provides that, during special campaigns, when the utility establishes a special price on an item, the discount of the dealer is protected and the manufacturer or wholesaler will have to look out for other dealers when he wishes to conduct a special campaign with the utilities' participation.

4. The utility shall not accept the exclusive sale of an appliance, unless equivalent items are available to other dealers.

5. No premium shall be given, nor trade-in allowances made, in connection with the sale of any appliance, unless all agencies selling that same appliance are offered participation. Manufacturers' national campaigns, based on either of these inducements, are to be discouraged.

6. Co-ordinated advertising should be developed by the utility and other dealers with the view of making available to the dealer all reasonable co-operation in advertising, displays and sales promotion.

7. Down payments, carrying charges and the length of installment terms shall permit of fair competition. Small appliances, if sold on installment terms, shall carry an adequate finance charge. Manufacturers' national policies, when inconsistent with sound practice, are to be discouraged.

In this principle special stress is placed on fair competition as applied to the small independent dealer with terms for down payments.

8. On any combination bill, rendered by a utility, the amount due for merchandise shall be clearly segregated from the amount due for utility service.

9. Compensation of utility appliance salesmen shall be such as to attract and hold qualified and responsible representatives. The activities of all salesmen should be

controlled so as to avoid misrepresentation and other unfair selling tactics.

10. In extending its services to new customers the utility shall not make the purchase of appliances from any given source a factor in the situation.

11. The utility shall segregate all merchandising accounts from operating accounts. The presentation to the public of appliances and uses not having reasonable consumer acceptance is a promotional activity, and as such shall be charged to the appropriate operating account in accordance with the State Uniform Classification of Accounts.

These state-wide principles are carried into operation in the local territories and a sample of this accomplishment is the development in the territory of the Philadelphia Electric Company.

This company issued a printed statement of policy in promoting and selling gas and electric appliances which embodied the principles and an introductory statement which pointed out the need for this utility to continue to promote the use and sale of appliances. This printed policy was made available to all retail outlets and to employees. But this was not the end. Each employee was sent a more detailed statement about utility merchandising, including an explanation of the competition between retail outlets, the complexity of the distribution system, the reason utility merchandising was a needed activity, the reason for announcing the merchandising principles and the reason each employee should understand and be able to explain the merchandising policies and practices of the company. It became the responsibility of every supervisor in the company to see that the employees understood and followed these company policies.

An equally vigorous effort was made to tell the utility merchandising story to all retail outlets and to local jobbers and manufacturers' representatives and to explain to them the principles and their application to merchandising activities by the company.

Thus the policy of the company was made known to all parties concerned with the sale of appliances in the territory, to the employees and to the public, so that all should be informed, in the hope that stabilization and market development would ensue.

As a consequence a decided impetus was given to the activities of the Electric Association of Philadelphia which has made more active this energetic organization, in which the utilities, dealers, jobbers and manufacturers find a common forum for discussion and action. The dealer division of the association has been especially vigorous in advancing the interests of the dealers and in developing co-operation in market development. Many tangible services worth real money to dealers have been offered by the association. This direct-aid activity is a concrete background upon which to build the more intangible co-operative contacts in sales and trade practices. The statement of utility merchandising policy and the hearty co-operation of the utility in the local league activities has been a decided stimulus to these developments.

The principles have had a trial in merchandising activities in the Philadelphia territory. Range and refrigerator sales and campaigns and general merchandising have offered opportunity to develop the principles and apply them in practice, and the results to date have been very encouraging. The policy and the position of the utility have been made clear and have been accepted; the dealers have gained confidence in the utility, and the co-operation in sales efforts has been more tangible and more stable.

▼ ▼ ▼

Minor Decrease in Southern and Western Industry

Manufacturing activity in the South and West during April was at virtually the same average level as during March according to reports received by the ELECTRICAL WORLD showing energy consumption in various branches of industry.

In the South an upward turn in the food industry carried the index above the figure for April, 1931; the change in the latter, to take account of data not available when it was originally computed, should be noted. The paper and stone-clay-glass groups are close to last year's rate of activity at the same season. The metal industries continue low. Textiles declined.

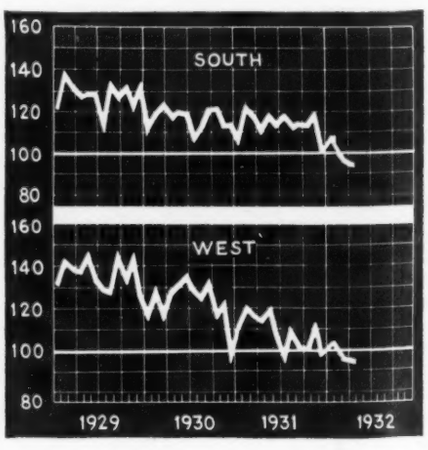
In the West most of the changes were small; the increase of 21 per cent in the stone group suggests activity in construction; the 16 per cent rise reported by the shipyards also deserves attention. The gains were balanced by moderate losses in more important lines, especially foods.

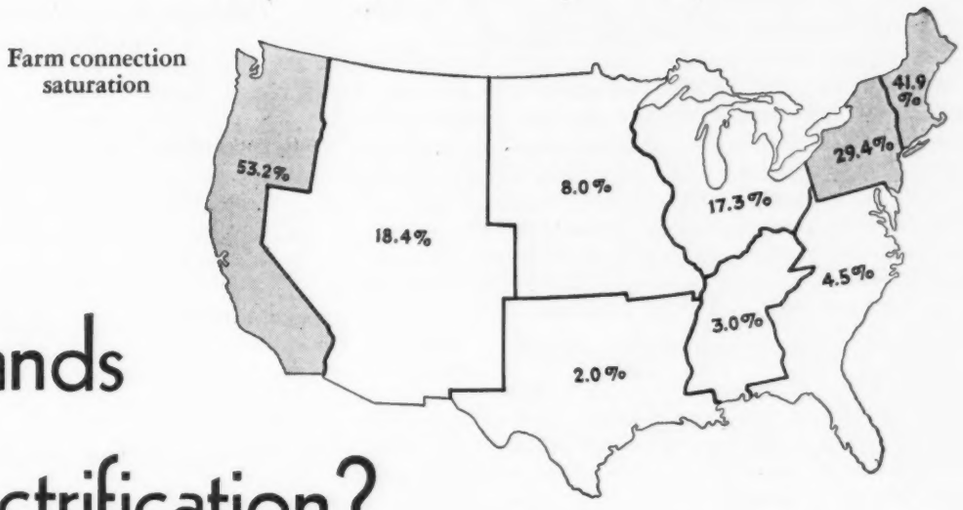
Indices of Industrial Activity in South and West

Base: Average Month, 1923-1925 = 100

	South					West				
Industrial Groups	April, 1932	Mar., 1932	Feb., 1932	Jan., 1932	April, 1931	April, 1932	Mar., 1932	Feb., 1932	Jan., 1932	April, 1931
All industry	**93.5**	**95.2***	**104.1**	**106.0**	**115.5***	**96.2**	**97.0**	**103.7**	**104.0**	**114.0**
Chemicals	122.5	127.4*	134.9	136.2	149.0	84.0	81.1	91.6	92.0	75.2
Food	148.0	135.0	151.0	154.9	143.2*	110.8	116.8	127.0	129.0	138.1
Iron and steel	76.0	82.1	117.6	145.2	203.7	.....	.....	.....	.....	.....
Metal working plants	59.8	60.6	68.8	64.1	92.0	.....	.....	.....	.....	.....
Metals Group	69.0	72.6	96.0	109.5	154.4	43.8	42.1	49.7	45.3	71.4
Forest products	44.5	48.4*	60.8	59.8	61.5	128.0	130.0	135.2	136.0	150.1
Paper and pulp	137.1	148.0*	140.5	124.8	139.5	123.1	132.3	121.4	121.0	120.6
Rubber	64.3	71.5	93.0	96.7	85.5	99.0	102.5	98.1	103.7	155.6
Shipbuilding	.....	.....	.....	.....	.....	100.7	86.4	87.4	96.7	82.0
Stone, clay and glass	147.9	126.1*	94.7	106.7	151.7	94.6	78.0	80.8	83.5	94.6
Textiles	85.6	96.2	107.0	97.4	102.9	.....	.....	.....	.....	.....

* Revision





How Stands Rural Electrification?

Farm service extensions continue despite adverse conditions, but rate of growth has never been and is not now consonant with market potentiality.

Progress being made in reduction of physical costs, but real need is for education of farmers in uses of electricity and for provision of means for financing purchase of equipment.

OUT of 6,288,648 farms in the United States 698,786, or 11.1 per cent, had electric utility service on December 31, 1931, according to N.E.L.A. statistics released by the committee on the relation of electricity to agriculture. Superficially, this does not appear to be a striking accomplishment for the ten or more years in which the work of rural electrification has been going forward, but this impression disappears when one considers the obvious difficulties in the way of electric service extensions to farm customers. Inspection of the regional map and the table, on which are shown rural service percentages for states and groups of states, exhibit to a person generally cognizant of farming conditions in these groups the fact that where circumstances have favored it rural electrification has indeed made great strides. It is quite apparent from the map that climatic, agricultural, social and population conditions have an immense effect on the speed with which the farms of the country are being electrified.

Until the electric utility can reduce the cost of service to the farmer to what he now thinks he can afford to pay or until the farmer will think he can afford to pay what it costs the utility to serve him there can be no spectacular increase of rural electrification in the United States.

Both phases of the problem are receiving attention. Costs are being reduced and the farmer is beginning to learn that he can pay more than he thought he could and can make money by doing so. The problem is being attacked by engineers who are scrutinizing costs and the reasons for them very closely, by utility executives who recognize the social responsibility of their industry and who see also the necessity for progress on a sound economic basis, and last, but not least important, by organizations of utility men, manufacturers and others who are trying by demonstration and example to show the farmer how he can use, with profit to himself, such quantity of electricity as will justify the expense of service to him.

Before embarking upon any discussion of what has been, is being or can be done toward progress in farm electrification it should be pertinent first to look at the potentialities of the rural market. According to the best statistics about 30 per cent of the population of the nation live in homes without electric service. Most of these people are on farms. And the farms use practically as much primary power as is represented by the total capacity of all isolated and central-station plants and for this power more than $3,000,000,000 annually is spent. When electric energy can be satisfactorily applied to all farm power requirements a potential market will be opened up for more kilowatt-hours than would be required if all of the steam railroads of the United States were electrified. It is apparent from this summary glance at the potential farm market for electricity that rural electrification means much more than simply the extension of service to farm customers as is indicated by the figures on the map. These figures might all be 100 per cent and still the essential job of farm electrification would be far indeed from complete accomplishment.

A conception of the magnitude of this job can be obtained from the accompanying estimate (Table II) of available farm business. This estimate contains many assumptions which may discount the totals considerably. But even so the validity of the greater part of the data is secure, and after so discounting the totals the figures that remain are tremendously impressive. The problem of rural service is not one, but two—to get service to the farmer and to persuade him to use it when

he has it. Work on these two problems must be coincident; one cannot move faster than the other.

The primary interest of the electric utility in rural electrification is revenue. Social responsibility is a factor, a strong one, but electric utilities are not eleemosynary institutions and they cannot undertake to serve any class of customers on any narrower base than that the revenue will pay at least the cost. Therefore conspicuous advances in farm electrification must wait until the converging efforts in reduction of cost of service and in persuading the farmer actually to *use* electricity have met and merged into a single stream of progress.

Service costs being reduced

Let us examine these efforts. Take, first, reduction in cost of service. This effort appears most clearly in the present intense absorption of utility engineers in the design and cost of rural lines. They are struggling, but not hopelessly, in a quagmire of figures and calculations involving quality of service, voltage regulation, provisions for future capacity, accounting methods, adaptability of rate structures, division of construction labor between farmer and utility, and many other pertinent, but now very bothersome, considerations. Already these engineers have uncovered three shining principles of rural line construction, one negative, two positive.

The first is that there is no profit in direct comparisons of per mile costs of lines unless the items included in each cost are completely stated. Such comparisons mean actually less than nothing, in that they are definitely harmful because they give a sharp edge to uniformed and, sometimes, malicious criticism. Superficially, criticism appears to be justified when one utility exhibits a cost of $556 for a mile of line and another states a cost close to $2,000. But unless all items, however small, are included in the compared figures there is no merit in their comparison. One stated cost may include the line, transformers, secondaries, services, meters, etc., and the other cover only the bare primary line. Also one line may be built in flat, open country along straight roads, while the other bends and turns up hill and down dale and requires an inordinate amount of tree trimming.

Therefore put no trust in comparisons of bare unit costs of rural line construction and the air will be cleared of much of the fog of argument that hangs over the subject.

One of the positive principles that the engineers have discovered is that the development of a long span type of construction—300 ft. or more—is a promising avenue toward reduction of rural line costs. Evidence of this is shown in Table III of span lengths and costs for one utility. In order that pole height may not have to be increased, it is obvious that for such long spans a conductor of sufficient strength to allow pulling up to a sag of 5 or 6 ft. under maximum loading and temperature conditions must be used. Long spans, however, are limited by trees, by terrain, local requirements and by service reliability elements.

Use high enough line voltage

The other definite principle is that there is no economy in trying to save money on an initial farm line investment by using a low primary voltage. As the lines are extended and load is added to them regulation becomes very poor and load capacity limits are quickly reached. A specific area in which rural service is to be developed

Table I– Farms Served by Electric Utilities on December 31, 1931

	1931	1930	Increase	Per Cent	Total All Farms	Per Cent Served
Total United States	698,786	649,919	48,940	+7.5	6,288,648	11.1
Maine	12,888	12,001	887	+7.4	39,006	33.0
New Hampshire	6,528	5,658	870	+15.4	14,906	43.8
Vermont	7,461	6,986	475	+6.8	24,898	30.0
Massachusetts	14,289	14,088	201	+1.4	25,598	55.8
Rhode Island	1,974	1,811	163	+9.0	3,322	59.5
Connecticut	9,097	8,452	645	+7.6	17,195	53.0
Total New England	52,237	48,996	3,241	+6.6	124,925	41.9
New York	51,439	47,147	4,292	+9.1	159,806	32.1
New Jersey	12,005	11,212	793	+7.1	25,378	47.3
Pennsylvania	41,467	37,983	3,484	+9.2	172,419	24.0
Total Middle Atlantic	104,911	96,342	8,569	+8.9	357,603	29.4
Ohio	45,730	43,242	2,488	+5.8	219,296	20.9
Indiana	22,106	20,503	1,603	+7.8	181,570	12.2
Illinois	26,994	22,699	4,295	+18.9	214,497	12.6
Michigan	34,230	29,869	4,361	+14.4	169,372	20.2
Wisconsin	37,833	34,800	3,033	+8.7	181,767	20.8
Total E. No. Central	166,893	151,113	15,780	+10.4	966,502	17.3
Minnesota	14,206	13,121	1,085	+8.3	185,255	7.7
Iowa	31,688	29,634	2,054	+6.9	214,928	14.7
Missouri	16,416	14,418	1,998	+13.9	255,940	6.4
North Dakota	1,834	1,711	123	+7.2	77,975	2.4
South Dakota	3,040	2,846	194	+6.8	83,157	3.7
Nebraska	9,930	8,960	973	+10.8	129,458	7.7
Kansas	12,603	11,593	1,010	+8.7	166,042	7.6
Total W. No. Central	89,717	82,283	7,434	+9.0	1,112,755	8.0
Delaware	1,296	1,163	133	+11.4	9,707	13.4
Maryland	6,961	6,614	347	+5.2	43,202	16.1
Dist. of Columbia	70	66	4	+6.1	104	67.0
Virginia	11,972	10,105	1,867	+18.5	170,610	7.1
West Virginia	3,307	2,891	416	+14.4	82,641	4.0
North Carolina	10,083	9,450	633	+6.7	279,708	3.6
South Carolina	3,746	3,493	253	+7.3	157,931	2.4
Georgia	5,309	4,372	937	+21.4	255,598	2.1
Florida	5,214	4,385	829	+18.9	58,966	8.8
Total South Atlantic	47,958	42,539	5,419	+12.7	1,058,468	4.5
Kentucky	7,716	6,815	901	+13.2	246,499	3.1
Tennessee	7,996	7,585	411	+5.4	245,657	3.3
Alabama	12,326	12,001	325	+2.7	257,395	4.8
Mississippi	3,475	3,548	(73)	—2.1	312,663	1.1
Total E. So. Central	31,513	29,949	1,564	+5.2	1,062,214	3.0
Arkansas	3,253	3,202	51	+1.6	242,334	1.3
Louisiana	2,447	2,218	229	+10.3	161,445	1.5
Oklahoma	4,927	4,517	410	+9.1	203,866	2.4
Texas	11,543	11,501	42	+0.4	495,489	2.3
Total W. So. Central	22,170	21,438	732	+3.4	1,103,134	2.0
Montana	2,377	2,192	185	+7.8	47,495	5.0
Idaho	12,402	12,126	276	+2.2	41,674	29.8
Wyoming	523	476	47	+9.9	16,011	3.3
Colorado	7,170	6,757	413	+6.1	59,956	11.9
New Mexico	1,340	1,242	98	+7.9	31,404	4.3
Arizona	4,110	3,805	305	+8.0	14,173	29.0
Utah	15,443	15,062	381	+2.5	27,159	56.8
Nevada	943	876	67	+7.6	3,442	27.4
Total Mountain	44,308	42,536	1,772	+4.2	241,314	18.4
Washington	36,143	33,803	2,340	+6.9	70,904	51.0
Oregon	16,388	15,767	621	+3.9	55,153	29.7
California	86,548	85,153	1,395	+1.6	135,676	63.8
Total Pacific	139,079	134,723	4,356	+3.2	261,733	53.2

should be studied from the engineering standpoint and a logical scheme of line construction laid down. If this is done the lesson of the following statement of line costs and voltages will be readily apparent and there will be no occasion for regrets in the future. This statement is from J. L. White, Appalachian Electric Power Company:

"Experience in rural line construction has led to the selection of 6,900 volts as standard for the Roanoke district. This voltage lends itself to initial installation in single-phase lines, thus keeping down the initial cost, and it is easy to add the third phase at a slight additional cost when the load warrants it. It has been found in general that although 6,900-volt lines cost slightly more than lower voltage lines the increase in capacity for the same size conductor more than offsets the cost increase. The following comparison shows that for 6,900-volt construction the increase in cost over 2,300 volts is 14 per cent, the increase in capacity over 2,300 volts is 800 per cent, the increase in cost over 4,000 volts is 8 per cent and the increase in capacity over 4,000 volts is 200 per cent.

"Another disadvantage of the lower voltages is that they require a larger number of substations to serve a given area. Lines of 6,900 volts also lend themselves to an increase of 12,000 volts Y as may be required without much additional expense."

Some specific costs

From information contributed for the preparation of this article certain specific costs are presented. These are customer costs; that is, they state the total capital increment investment necessary to serve a farm customer and include line, transformer, service, meter and all. For three customers per mile one company reports $508, another $534, a third works on a basis of $400 and requires customers to pay anything more than that. Another company reports $291 per customer in one district and $199 in another. Obviously the customer densities indicated in the last two costs are much higher than in the first three. These customer costs demonstrate the utter futility of cost comparisons unless complete data are given.

But while the costs of physical structures and equipments, including their erection and installation, and of the proportionate assignment of system capacity, represent the the capital investment for rural electrification,

Table II—Estimate of Farm Market for Equipment and Electricity

Furnished by H. E. Dexter, Central Hudson Gas & Electric Corporation, chairman N.E.L.A. committee on farm equipment

General	Saturation (per Cent)	Prospective Users for Equipment (per Cent)	Usage Kw.-Hr. per Year	Number in U. S. 1930 (Thousands)	Sales to Be Made (Thousands)	Cost of Equipment (Dollars)	Cost of Equipment Already Sold (Thousands)	Cost of Equipment to be Sold (Thousands)	Kw.-Hr. Sales from Existing Equipment (Thousands)	Yearly Kw.-Hr. from Sales to be Made (Thousands)
Electric pumps (including pump racks)	40*	60	120	279	419	100	$27,900	$41,857	35,600	50,100
Electric hot beds	0	1	450	0	7	15	0	105	.....	3,140
Farm shop	5	95	45	35	663	200	6,980	132,534	1,570	29,800
General-purpose motor	8	50	750	56	349	225	12,550	78,550	41,800	262,000
Hay hoisting	1†	50	50	7	349	60	419	20,940	349	17,450
Hay driers	..	10	5,000	0	70	4,000	.....	279,000	0	348,750
Dairy Farms										
Milking machine	11	40	700	77	279	500	38,400	141,500	53,760	193,000
Dairy refrigerator	2	49	1,200	14	342	600	8,376	205,200	16,750	405,000
Sterilizers	..	10	1,200	....	70	200	.....	13,960	.....	83,700
Dairy water heaters	1	60	1,000	7	419	50	349	20,950	8,370	419,000
Cream separators	14	14	50	97	98	125	12,200	12,200	4,880	4,880
Churners	..	1	20	....	7	25	.....	175	.....	140
Barn ventilators	1	50	600	7	349	150	1,045	52,400	4,185	209,400
Horse and cow clippers	5	50	25	35	349	20	698	6,980	876	8,730
Animal groomers	1	50	30	7	349	50	349	17,450	209	10,470
Feed Equipment										
Ensilage cutters	5†	40	225	35	279	300	10,470	83,700	7,960	78,500
Stock tank water heater	2	30	250	14	209	25	349	5,230	3,490	52,300
Grain grinder	5*†	10	100	35	70	100	3,490	6,975	3,490	3,490
Grain elevators	1	15	30	7	105	50	367	5,230	209	3,138
Poultry Farms										
Incubators	4*	10	4,000	28	70	2,500	69,800	174,300	111,600	279,000
Brooders	1*	7	750	7	49	30	209	1,464	5,235	36,600
Poultry house lighting	5	15	250	35	105	20	698	2,092	8,730	26,200
Poultry water heater	1	5	200	7	35	10	70	349	1,395	6,980
Burglar alarms	1	15	5	7	105	25	174	2,615	35	523
Ultraviolet lighting	..	15	800	....	105	40	.....	4,184	.....	83,680
Corn sheller	..	10	10	....	70		.....	.....	.....	698
Fruit Farms										
Stationery spray pump	3	15	1,000	21	105	1,000	20,950	104,600	20,950	104,600
Irrigation systems	1	5	8,000	7	35		.....	.....	55,800	279,200
Bug hatchery	..	..	....	....	.....	....	.....	.....	.....	.....
Miscellaneous										
Sheep shearer	1	5	15	7	35	20	140	698	104	524
Fly control	1	50	75	7	35	10	70	349	523	2,612
Electric tractor	..	100	1,300	0	70	....	.....	.....	.....	907,000

* Indicates saturation given by *Electricity on the Farm.*

† These equipments now in use not operated electrically but electric devices available.

no immediately perceivable reduction in these costs offers much hope of radical decrease in the price of electricity to the farmer. There is no possibility now that the expense of rural distribution can be brought so low as to provide electricity to the farmer on the same terms as it is sold to the city dweller. The customer density in rural service is much too low ever to permit this.

The only real hope of cost reduction to the farmer lies in building up his use of electricity to such quantity as will make his unit cost of energy low enough to be profitable, and therefore desirable, to him.

Since this requires a capital outlay from the farmer to purchase the necessary electrical equipment the job of selling motors, refrigerators, ranges, heaters, milkers, brooders, incubators and other articles of electrical virtue to the dweller in the fields and glades is a heartbreaking one under present farm conditions.

Evidence of increased use of energy

But in spite of its difficulty, the job is being done. One Illinois utility reports average kilowatt-hour increase by years from 1927 of 100, 140, 60 and 40 up to an average per rural customer in 1931 of 793 kw.-hr., while the average net rate per kilowatt-hour drops from 9.22 to 7.24 cents. From Indiana another company states an average increase of 20 kw.-hr. per customer per year from June 1, 1930, to June 1, 1931. The Public Service Company of Northern Illinois reports average annual rural consumptions of 744, 768 and 852 kw.-hr. for 1929 to 1931. The Alabama Power Company reports an increase of 814 to 895 kw.-hr. from 1930 to 1931. From Pennsylvania is reported an increase from 520 to 840 kw.-hr. per rural customer per year from 1927 to 1931. In the Roanoke district of the Appalachian Electric Power Company the average annual consumption per farm customer rose—1928, 1,003 kw.-hr.; 1929, 1,086 kw.-hr.; 1930, 1,207 kw.-hr.; 1931, 1,230 kw.-hr.—while the net rate dropped from 5.3 to 4.45 cents. In the Lynchburg district of the same company, containing three very large farm customers, the average consumption rose from 2,341 kw.-hr. in 1930 to 2,559 kw.-hr. in 1931. Indicative of how use of energy affects the rate is the net of 3.2 cents per kilowatt-hour in this district in 1931. In Michigan, for the whole state, annual average consumption increased from 360 kw.-hr. in 1926 to 750 kw.-hr. in 1931.

The figures recited here are not sufficient to justify a conclusion that nationally more electricity per farm customer was sold in 1931 than in 1930. Rather, one must conclude that the national average consumption was less in 1931 than in 1930, since the total average agricultural usage increased only about 5.2 per cent, while the number of farms connected increased 7.5 per cent. Yet if the specific figures of increases quoted here prove nothing, they do indicate something, and this is that, even in a year when business is apparently sounding the uttermost depths, the American farmer in considerable number can still find the money in his sock to buy what he wants if it is proved to him that he wants it, needs it and can make a profit on it. This indication is borne out by the fact that east of the hundredth meridian the average use did increase in 1930, while it declined somewhat west of the line.

But however much encouragement one may extract from such isolated instances as are quoted in the preceding paragraphs, the conclusion is inescapable that the promotion of electric service on the farms of the United States has never been really effective and that in the past two or three years it has declined in results, if not in effort. The reason probably is as stated by a man enthusiastically interested in farm electrification. He says: "Without a doubt one of the greatest handicaps in developing the farm equipment business is the fact that neither the utilities nor the companies manufacturing farm electric equipment really, conscientiously believe in their own minds that this market holds anything of value for them. Consequently they hesitate to put the same kind of effort and amount of money into its development that they do into other potential markets."

This statement is essentially correct. The farm market for electrical equipment and for electric service has not now and has never had attention comparable to its potentiality. There is an obvious reason for this attitude on the part of utilities and manufacturers. Agriculture in the United States has progressively declined in the years since the World War and the American farmer has become a resentful and discontented figure in the national picture. The causes for this are not discussable here, but they are known to every one and need not be enlarged upon in this article. Thus such work as is being done in the promotion of farm electric service is opposed by the great odds against it.

But every worth-while victory has been achieved against odds and in the devoted men and women engaged in the promotion of electricity on the farm there is no disposition toward defeat.

Profit to the farmer

Every one of the farm uses of electricty listed in the market estimate that accompanies this article was developed with the thought in mind that it would show a profit in money, labor or comfort to its user. Of these, the money profit appears the most important right now and, naturally, the accent of attention is being given to it.

Table III—Relative Effect of Span Lengths on Costs per Mile of Rural Line

While these are actual figures, they may not be taken as typical nor inclusive of all costs. Their purpose is simply to indicate the effect of span length on cost of line construction alone for one property.

Average span (feet)	244	286	316	352
Material (except poles)	$430	$324	$312	$275
Poles	315	276	181	145
Labor	247	190	162	133
Labor and material	$992	$790	$655	$553

Twenty-four state committees on the relation of electricity to agriculture, many experiment stations and farm extension departments operated by land grant colleges, rural electrification departments in, as yet too few, electric utilities are working together to show the farmer how the use of electrcity can be profitable to him and to assist him in realizing that profit when he has decided to go ahead. Any one interested can get convincing information and data application from Vol. VII, No. 1, of the C.R.E.A. Bulletin. Hotbed heating, plant irradiation, incubating and poultry brooding, dairy equipment and others promise to put the farm on practically a

factory production basis in these lines and to open up avenues to profit uninfluenced by the climatic and seasonal mutations at whose mercy the farmer's income traditionally has lain.

Financing purchases is the key

The classic method of farm operation financing is the crop loan. Although long-term credits secured by real property mortgages are common enough to have solidified the assets of many country banks to an embarrassing degree, really the only means by which the farmer may hope to finance the purchase of electrical equipment is by short-time borrowing. But usually he needs his short-time credit to finance his crops and the average country banker, remembering the real estate mortgages reposing in the vault, does not look with favor on chattel-secured paper. Consequently unless the farmer actually has the money to pay for electrical equipment when he buys it there is little chance for a sale to be made. The need for an adequate and widely applicable plan for financing the purchase of farm electrical equipment is plainly evident. That such a plan cannot rest upon the resources of the country banker is also plainly evident. The only parties that can undertake such a plan, and they are the ones that should undertake it, are the electric utilities and the manufacturers of farm electrical equipment. If the automobile makers can extend credit through financing corporations to any one who walks into a salesroom and makes a down payment on a car, then the utilities and the equipment manufacturers should be able to carry the farmers until the equipments they have bought have paid out. It is useless to hope for any development of this kind while general business conditions continue as they are. But it must come if real farm electrification is ever to emerge from mere dreams and speculations.

On the question of what agency should sell equipment to the farmer there appears to be no great division of opinion. Merchandise sales to rural customers fall into two general classes, domestic appliances and strictly farm operation equipment. Of the first class there is no point in saying anything here; domestic appliance merchandising is a matter already sufficiently embroiled without dragging rural electrification into it. But the sale of farm-operating equipment is another thing. The disposition of the utilities appears to be to stay out of it. The reason for this is quite plain. It is that farm equipment dealers are already established, they have the farmer's confidence and they understand the market. It is true that the utility in many cases has as hard a job to sell rural electrification to the equipment dealer as to the farmer himself, but most of the dealers are willing to play their part. But as yet there has been no nationally concerted action to enlist farm-equipment dealers, as a class, in the program of rural electrification.

Table IV—Yearly Connections of Customers for One Utility With Guaranteed Annual Minimum

Year Connected	Number of Customers	Average Guaranteed Revenue	Average Actual Revenue	Average Kw.-Hr. Per Month
1927	19	$106.00	$165.50	251
1928	74	122.50	140.60	169
1929	103	122.00	137.00	148
1930	160	130.00	136.70	130
1931	84	131.50	141.70	122
Average	88	$126.50	$139.50	144

Approach to this is made in the motion passed at the meeting of the farm equipment committee, N.E.L.A., on March 23, 1932: "That a committee be appointed by the chairman, to include at least two manufacturers who are members of the farm equipment committee, to arrange for a joint meeting with a group of manufacturers interested in the sale of farm electric equipment, to interest if possible those manufacturers in setting up sales plans for their particular products which could be used by them with local dealers and which would fit in with a plan of dealer co-operation on the part of the utilities."

Rates not the problem

So many different charges are made for rural service that one becomes lost in the confusion of investment guaranties, proportionate investment advances and returns, refunds for later connections, transformer capacity charges, minimum bills, and so on. There may be even less unanimity of thought on rural rates than there is on rates for better developed classes of service.

Existing rate schedules are largely expressions of local conditions and are thus understandably different one from another. However, there seems to be a crystallizing of opinion in rural service rates centering on the guaranty idea. The idea is simple and has that to commend it. It is merely that the farmer customer shall guarantee the turnover of the investment to serve him once in five years, more or less. The monthly payments which are thus guaranteed cover a stated monthly use of energy.

The method is open to a certain objection in that the farmer, made penurious by adversity, may try to use no more than the amount of energy covered by his guaranty. But this is not serious because it is easy to show any person of average intelligence that the unit rate for energy so restricted in use is quite high. The experience of the Nebraska Power Company with the guaranty type of rate does not bear out this objection (see Table IV). The guaranty required by this company is 20 per cent per year on the increment investment required to serve the customer. The Pennsylvania Joint Committee on Rural Electrification, by means of an order of the state Public Service Commission in 1927, fixed the guaranty type of rate in that state. At first the guaranty was set at 2 per cent per month, but was later reduced to $1\frac{3}{4}$ per cent. Rulings of other state commissions have made this rate acceptable in their jurisdictions and in most cases the maximum guaranty was allowed to be 2 per cent.

In a few words

This presentation of the existing status of rural electrification has had to be a summary one. However, this high spot inspection, cursory as it may be, does show quite clearly these things: (1) That rural electrification progress is slow at best; (2) that the potential rural market is enormous; (3) that reduction in investment cost of service is being accomplished, but (4) that greatly reduced cost of energy to the farmer must come about through increased use of energy; (5) that for good and sufficient reasons utility and manufacturing executive interest is lukewarm; (6) that a plan is needed for financing purchases of farm electrical equipment; (7) that farm equipment dealer co-operation is desirable, and (8) that rural rate forms are not a problem.

Extending Co-operation to the

Electrical Association of Philadelphia creates dealer division and retail merchandising bureau.

Direct aids to dealers and definite organization for market development

Look for This Sign
1932 MEMBER
THE ELECTRICAL ASSOCIATION OF PHILADELPHIA
THE SIGN OF DEPENDABILITY
It Is Your Protection
You will find it on the windows and inside of stores and shops selling electrical appliances, wiring and supplies.
Be Guided By This Sign
It is always wise to buy electrical goods of known quality By this sign you will know the dealer or contractor who sells goods of safe and dependable character It is the mark of a good merchant and of reliable service
THE ELECTRICAL ASSOCIATION OF PHILADELPHIA
Architects Building—17th Street at Sansom
A non-profit organization of representative dealers contractors distributors manufacturers and utilities

Newspaper advertisement used to identify dealers with association activities

THE Electrical Association of Philadelphia has created a dealer division and a retail merchandising bureau for the purpose of broadening its membership and extending its activities to the firing line of the electrical industry—the retail establishment. For many years this organization has been one of the most active in the country in the promotion of adequate wiring and lighting and the use of all electrical appliances. In 1931 it spent more than $75,000 in promotional advertising. In view of present conditions and the emphasis now being placed on co-operative work with retailers, the association is now endeavoring to bring about an improvement in the methods employed by all dealers in electrical merchandise.

This undertaking was launched after a survey which brought to light many delinquencies in the methods employed by the average dealer. It also uncovered a number of adverse conditions which were not within the dealers' control. The development of the dealer division therefore involves not only the solicitation of memberships, the dissemination of basic information and the stimulation of retail sales but likewise the promotion of a better understanding of the dealers' problems by the wholesalers, manufacturers and utilities in the Philadelphia metropolitan area. All have exhibited a willingness to give their whole-hearted support to this movement.

The first development was the creation of an insignia of membership, herewith reproduced, which definitely ties in the dealers with the promotional advertising of the association. It appears in decalcomania form on the windows and again on an enlarged sign within the dealer's establishment. The value of this insignia is emphasized in newspaper advertising and receives further publicity through its repeated use by the larger merchandising organizations, such as the refrigerator and range distributors and the utility. When a dealer becomes a member of the Electrical Association and can display "The Sign of Dependability" his customers unconsciously acquire a feeling of confidence in his work and merchandise. Inasmuch as this insignia appears constantly in newspapers and on billboards, circulars, etc., the public in the Philadelphia metropolitan area is becoming thoroughly aware of its significance. The dealer members are furnished with small electros of the insignia for imprint on cards, letterheads and circulars.

The dealer members are furnished with cards introducing prospects to the association's Lighting Exhibit. Qualified attendants demonstrate the latest developments in lighting, wiring and the use of appliances. As an example of the value of this service, a contractor secured $88 worth of additional work from a client who did not realize his need for certain equipment until he saw it applied and demonstrated in the Lighting Exhibit. Similar instances occur frequently

The association has created facilities to discover the

An example of co-operative advertising on billboards

the Firing Line

By G. R. CONOVER
Managing Director
Electrical Association
of Philadelphia

A color theater in the electrical association Lighting Exhibit permits demonstrations of high-intensity illumination and color lighting

The industrial room at the association Lighting Exhibit demonstrates five separate systems of shop lighting

best methods to be followed in the conduct of the retailer's business and is in a position to give assistance and counsel on merchandising, sales and business management. Under the general heading of merchandising and sales management the association staff offers assistance to its membership on store location and arrangement, display of merchandise, advertising in its various forms and sales management, including the employment, training and supervision of salesmen.

Under the classification of business and financial management it advocates approved methods involving the employment of capital, the budgeting and accounting of overhead expense, purchasing and inventory control, compensation of salesmen, including the establishment of adequate reserve funds and other safeguards to the dealer, and the handling of installment accounts, in which is incorporated the most effective collection procedure. These services are furnished without charge to association members.

Standard forms have been developed and are available to the membership without cost. One of these is an employment agreement for the use of dealers who employ outside salesmen. This agreement is written so that the employer is protected against the operations of dishonest salesmen and can escape many of the difficulties with employees in which the dealers frequently become involved. In this connection a reference exchange has been established.

An accounting system has been developed and is available to the members at the nominal cost of $15, which includes the necessary books and forms and the installation of the system by a staff accountant, who is also available to all members for advice on accounting problems. Assistance in the preparation of income tax returns is extended to members. These services are not charged for unless a member asks for an excessive amount of help.

As the membership increases it is anticipated that a considerable saving will be made by the members through the use of standard accounting forms and other printed matter. The association intends to secure such material in large quantities and pass the saving on to its membership. This is particularly true of such forms as prospect cards, inventory cards, ledger pages and other forms which do not require the individual dealer's name.

Tie dealers into campaigns

The association staff has arranged and conducted a number of definite co-operative campaigns and activities in which its membership has participated with substantial profit. At present campaigns are under way on electric refrigerators, ranges and water heaters. In addition, the association staff has conducted co-operative refrigeration shows and electric and radio shows, which have resulted in a very satisfactory volume of business for those who participated and a stimulation in the sale of the products exhibited.

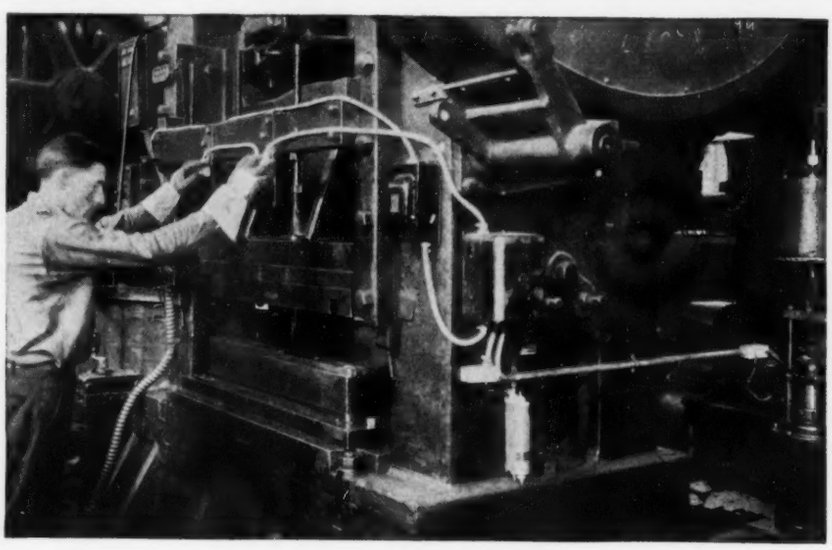
In addition to the above features of this plan the dealers have many advantages—the privilege of attending meetings, lectures and conferences; the use of the association dining room; issues of bulletins containing timely information having a direct bearing on their business.

The entrance fee, which formerly was $10, has been waived by the board of governors during the development of this plan. The annual dues are $20, and this may be paid in installments of not less than $5. The dealers are organized into geographical sections so that those who reside in suburban areas do not lose their local identity. Each section has its executive committee and meetings are arranged as occasion demands in the various sections so that local problems and conditions can be effectively dealt with.

The response from dealers and the results so far accomplished indicate that the plan will have a far-reaching effect on the distribution of electrical appliances through the smaller outlets. If the success of the chain store is based on its ability to determine the best methods, and then standardize those methods throughout the chain, it is easily conceivable that the electrical industry will benefit if the best methods are known to and employed by the men on the firing line.

▼ ▼ ▼

280-Ton Press Operated by Thrustor and Two-Hand Control



Motor drive converted to straight-line effort by oil pump and piston. Operator's hands cannot be injured during operation with this control.

Courtesy General Electric Company